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HAND FEEDING DAIRY COWS.

An Experiment.

By B. A. Barr, Senior Dairy Supervisor.

The system of hand feeding, or supplementing the grass by concentrated foods, is regarded by many who have not practised it as unprofitable. Some who do practise the system fail to attain the desired result, due partly to the choice of foods and partly to the amounts given.

It is only on farms favorably situated that it is possible to provide sufficient food to maintain a good herd milking at its full capacity throughout the year; consequently, it is both necessary and profitable to provide such an amount of concentrated food—the farm usually produces an abundance of the bulky food—as bran, oats, pollard, gluten feed, oil cakes, &c., at such times as the scarcity of grass or farm-grown crops demands, and the price of milk or butter-fat warrants, for the reasons given in a previous article, "The Dairy Cow as a Machine."*

The leading rule in the feed-shed should be: Give the best feed to milking cows, and as much as they will profitably consume. The best feed is that which contains the largest amount of nourishment for any given price, and is also the cheapest. In selecting feeds, the available nutriment contained in the article is more important than the price. It is not the number of pounds of feed which is purchased for 1s. which determines the relative cheapness of a feed, but the number of pounds of easily-digestible food substances—as protein, carbohydrates, and fat—which is obtained for 1s. Bran, at £4 10s. per ton, is cheaper than lucerne hay at £2 15s. per ton. Bran, at £4 10s. per ton, is equal in

* *Journal of Agriculture*, Victoria, January, 1916, p. 34.

value to oats at 2s. 1d. per bushel. Gluten meal, or polly meal, at £5 per ton, is equal in value to bran at £4 10s. per ton. The oil cakes, linseed, and cocoanut, cannot be compared satisfactorily with bran, oats, &c., because they differ from them so greatly; but from ½ to 2 lbs. may be added to any ration, according to the season.

A mixed ration gives a better return than one composed of a single food. The spring grass, on which the cows milk so heavily, includes a large number of varieties, and what is deficient in one is provided by another, and the mixture of grasses provides a large amount of palatable and digestible food substances.

If more consideration and common sense were given to the feeding of our dairy cows, the fluctuations of the industry caused by seasonal influences would become less, and a more regular, as well as increased, output would result.

In test, or butter-fat percentage, the milk of the Victorian herds is superior to some, and equal to that produced in any dairying country of the world; but in quantity of milk, they are far behind, such being due to a want of the necessary kind and amount of feed which will enable the cows to produce milk to their full capacity for secretion.

It is a significant fact that, whilst the average yield per cow in Victoria is about 380 gallons, and 160 lbs. fat, during an average season, 227 cows, including heifers, during the past dry year, yielded, in nine months, an average return of 572 gallons, and 292 lbs. fat. This return was taken from fifteen herds, where the milk was weighed daily and tested monthly, and in each case the herds were kept for profit—some supplying cream to butter factories.

One herd of 31 cows averaged 809 gallons of milk, and 383 lbs. fat; another of 64 cows averaged 602 gallons, and 337 lbs. fat; whilst, in one instance, 58 cows averaged 334 gallons, and 144 lbs. fat; and another of 20 cows averaged 479 gallons, and 202 lbs. fat. These returns show the difference between good and bad feeding. In every case where a high return was secured, a small amount of concentrated feed was given, and in the others, where a low return was obtained, the cows depended on grass and hay only.

It has been difficult to obtain locally reliable results of feeding various rations, but the following, obtained by a dairy farmer in the north-east of Victoria, is instructive, and proves that, under suitable conditions, it pays to spend a little extra on the cow's feed. It likewise shows that a greater amount of nutriment for conversion into milk can be secured by a careful selection of feeds; the slightly-increased cost materially increasing the profit.

The weight of milk yielded by each cow was weighed daily, and each ration was fed for thirty days.

The paddock feed was dry, and no green fodder was available, but each cow was receiving daily:—

RATION I.

9 lbs. chaff, at £3 10s. per ton ...	... 3½d.
7 lbs. crushed oats, at 2s. 8d. per bushel	... 5½d.
16 lbs.	9d.

At the writer's suggestion, the ration was changed to:—

Ration II.

10	lbs. chaff, at £3 10s. per ton	3¾d.
3½	lbs. crushed oats, at 2s. 8d. per bushel ...	2¾d.
2⅓	lbs. bran, at £4 10s. per ton	2d.
1	lb. pollard, at £7 per ton	
1	lb. linseed oil cake, at £10 per ton ...	1d.
18	lbs.	9½d.

The indications which suggested the change were:—

(1) Gradual decrease in milk yield of heaviest milkers.
(2) Loss of condition of cows.
(3) An examination of the feed showed that, after due allowance was made for the grass consumed, it contained less nutriment than the milk, plus that required for the maintenance of the animal: consequently, both the milk yield and condition of the cows was rapidly decreasing.

The milk yield was as follows:—

No. of Cow.	Ration No. I.		Ration No. II.		Increase.		Fat.	Months in Milk.	Age.
	Thirty Days' Milk.	Daily Average.	Thirty Days' Milk.	Daily Average.	Thirty Days' Milk.	Daily Average.			
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.		yrs.
1 ..	420	14	465	15½	45	1½	2.29	8	2
2 ..	549	18	644	21½	105	3½	4.39	7	7
3 ..	482	16	555	18½	77	2½	4.08	7	2
4 ..	721	24	826	27½	106	3½	5.83	5	6
5 ..	556	18½	571	19	15	½	1.02	4	2
6 ..	808	27	914	30½	104	3½	5.5	3	7
7 ..	825	27½	1,016	34	191	6½	8.02	3	5
8 ..	675	22½	750	25	75	2½	3.22	2	2
	5,017	21	5,741	24	90	3	34.95	..	..

The milk yield had been gradually decreasing on ration No. 1.; by increasing the feed, not only was this checked, but turned into an increase of 35 lbs. of fat, at 1s. 2d., £2 0s. 10d.: the increased cost of food was 10s.; leaving a net profit of £1 10s.; and, in addition to 70 gallons of skim milk and an extension of the milking season, the loss of condition was arrested.

The increase is greater than the figures indicate, because four of the cows were well advanced in their lactation periods, and heavy in calf.

No. 5 did not pay for the extra food, which was stopped.

The profit depended on two factors:—

(1) The cows were not getting all the food which they could profitably transform into milk, and the addition of any nitrogenous foods was rapidly followed by an increase.
(2) An increase of the protein content of the ration by one-third without materially increasing the cost.

Summed up, the advantages, in this case, of properly feeding the cows are:—

(1) The highest market price for farm-grown hay and oats, without any cost for bags, freight, commission, &c.

(2) An extension of the milking season; if each milking cow in this State milked for one week longer than at present, on good feed, an additional return of £100,000 would be received.

(3) An expenditure of 10s. on the most suitable feeds brought in an increased return of £2 0s. 10d.

(4) The loss of condition was checked. Those cows heavy in calf, and completing their milking season, gained in weight: and whilst the amount of butter-fat produced left a profit over the cost of feeding, their improved condition would render them fit to enter at once into a productive season on calving. Whereas, if the increased feed had had not been supplied, the loss of condition would have been greater, and, on calving, several weeks would be necessary to build them up: and the food used for this would not be available for milk secretion

Charcoal (powdered) is recommended as an absorber of gases in the milk room. It should be freshly powdered and kept there continually, especially in hot weather, when unwholesome odours are most liable to infect the milk.

Eggs may be preserved by adding to a bulk of one bucket of water, two pints of fresh slacked lime, and one pint of common salt. Mix well. Fill a kerosene tin half full with this emulsion, and then put in your eggs. They will keep for a year.

In summer time the season of ripening moves northward at the rate of about 10 miles a day.

APPLE DRYING.

By J. Farrell, Orchard Supervisor.

Owing to the continually increasing area under orchards, land values, and cost of fruit production in this State, the necessity for making provision for the utilization of surplus and waste fruits, has for some time engaged the attention of the Department of Agriculture, and more particularly the officers of the Orchard Supervision Branch.

As increased production of fruit generally means a corresponding increase in the quantity of surplus and waste fruits; the conversion of the latter into economic use is a phase of fruit-growing which it is desired should receive more attention from the fruit-growers in future.

for in the past but little has been done to turn this class of fruit to profit.

Should fruit production increase at the same ratio for the next ten years as it did during the past decade, it is obvious that, after the war, strenuous efforts must be made to find new export markets, as well as to hold those already exploited; for it is only by the judicious manipulation of our exportable fresh fruits that we can expect to maintain our position as a fruit-growing State. The stimulation of Inter-State and local fruit trade is also desirable, and particularly in the interest of small growers who do not export.

In order to show clearly the number of fruit-growers, area under orchards, and the quantity of fruit produced in Victoria during the years 1906-15, the following table, and note under same, have been taken from the *Victorian Year-Book* 1914-1915:—

ORCHARDS GROWING FRUIT FOR SALE, 1905-6 TO 1914-15.

Year ended March.	Number of Fruit Growers.	Area under Gardens and Orchards.	Large Fruits Gathered.			
			Apples.	Pears.	Quinces.	Plums.
	Acres.	Acres.	Bushels.	Bushels.	Bushels.	Bushels.
1906 ..	5,163	47,312	578,700	219,864	56,898	130,917
1907 ..	5,363	49,086	1,010,381	303,647	77,277	237,468
1908 ..	5,241	49,212	618,424	182,609	47,871	157,366
1909 ..	5,586	50,675	1,241,825	373,145	99,608	167,012
1910 ..	5,647	51,578	1,121,702	253,195	50,559	232,657
1911 ..	5,780	53,325	1,667,271	640,436	86,355	325,677
1912 ..	5,955	55,769	1,330,961	239,431	54,425	151,936
1913 ..	6,285	59,119	2,036,756	669,898	90,119	266,830
1914 ..	6,498	63,058	1,653,035	476,430	67,799	292,389
1915 ..	6,811	70,392	509,697	401,361	32,949	88,698

Year ended March.	Large Fruits Gathered.						
	Cherries.	Peaches.	Apricots.	Oranges.	Lemons.	Figs.	Others.
	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.
1906 ..	116,845	132,870	154,791	21,364	63,904	32,467	12,339
1907 ..	120,496	276,077	258,049	23,431	37,662	29,549	16,817
1908 ..	71,798	290,178	239,735	28,620	46,827	20,460	10,753
1909 ..	59,012	282,040	149,262	22,363	38,548	23,687	17,462
1910 ..	100,054	291,764	292,496	34,027	51,130	22,675	10,566
1911 ..	121,756	317,317	160,884	59,723	71,041	31,054	21,200
1912 ..	96,663	260,258	281,460	48,982	65,833	17,891	16,259
1913 ..	152,257	289,731	138,881	44,039	48,170	25,223	19,496
1914 ..	151,262	361,414	308,307	63,542	57,562	23,764	15,639
1915 ..	48,411	277,435	109,301	83,220	66,704	17,362	16,040

The area under orchards growing fruit for sale increased steadily from 5,800 acres in 1872-3 to 10,048 in 1882-3, 31,370 in 1892-3, 44,502 in 1902-3, 59,119 in 1912-13, and 70,392 acres in 1914-15—which is the largest area recorded.

The following table, and note under it, also taken from the *Victorian Year-Book*, shows the quantity of dried fruits produced in this State during the years 1905-6 to 1914-15, and for 1895-6 to 1902-3 respectively:—

DRIED FRUITS, 1905-6 TO 1914-15.

Year ended June.	Apples.	Prunes.	Peaches.	Apricots.	Figs.	Pears.	Total.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1906 ..	19,290	9,207	27,703	252,746	29,227	..	338,173
1907 ..	42,113	64,648	109,958	143,970	37,716	..	398,405
1908 ..	35,544	25,504	87,383	223,091	13,112	8,077	392,711
1909 ..	69,120	50,183	84,514	170,620	26,796	30,322	437,555
1910 ..	46,767	76,015	109,661	539,910	22,160	17,422	811,935
1911 ..	26,391	80,123	84,211	334,111	9,554	31,819	566,200
1912 ..	21,929	72,460	143,112	492,041	31,027	16,502	777,011
1913 ..	48,853	84,053	56,151	61,465	27,274	38,633	316,429
1914 ..	39,899	155,031	118,187	363,356	33,551	7,900	717,52
1915 ..	16,817	28,788	70,897	43,606	31,981	55,581	247,670

The quantity of dried fruit (weight after drying) was for the first time collected in 1895-6, when 179,460 lbs. were returned, and it increased to 636,294 lbs. in 1900-1; after which date the quantity, principally by reason of a reduction in apricots, declined to 306,603 lbs. in 1902-3. In 1909-10, the maximum production—811,935 lbs.—was recorded. In 1914-15, the production was 247,670 lbs., which was the lowest return since 1896-7.

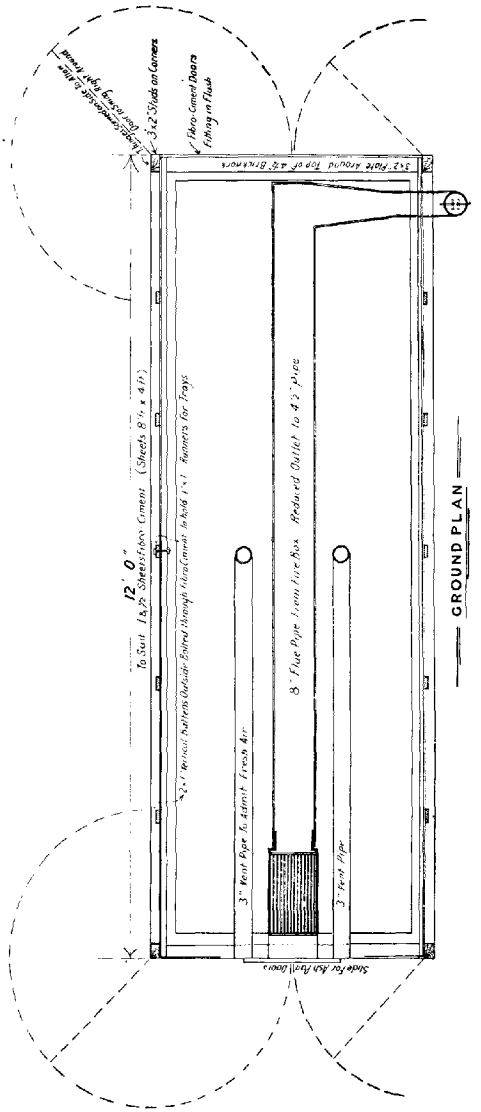
The table below, taken from the *Commonwealth Year-Book*, shows the Commonwealth imports and exports of dried fruits, also net imports over exports for the years 1901-13:—

COMMONWEALTH OVERSEA IMPORTS AND EXPORTS OF DRIED FRUITS, 1901, AND 1909 TO 1913.

Year.	Oversea Imports.		Oversea Exports.		Net Imports.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	lbs.	£	lbs.	£	lbs.	£
1901 ..	14,765,731	179,305	831,996	14,206	13,433,735	165,099
1909 ..	13,242,198	121,059	1,089,730	13,013	12,152,468	108,046
1910 ..	9,885,118	89,076	973,171	14,765	8,911,947	74,311
1911 ..	6,526,498	68,942	1,291,795	23,900	5,234,703	45,042
1912 ..	7,484,432	81,913	2,545,779	48,012	4,938,653	33,901
1913 ..	10,551,877	112,489	2,478,585	32,099	8,073,292	80,340

In 1901, the net value of the Commonwealth imports over exports of dried fruit was £165,099; but it came down to £33,901 in 1912, and went up again to £80,340 in 1913, the last year recorded.

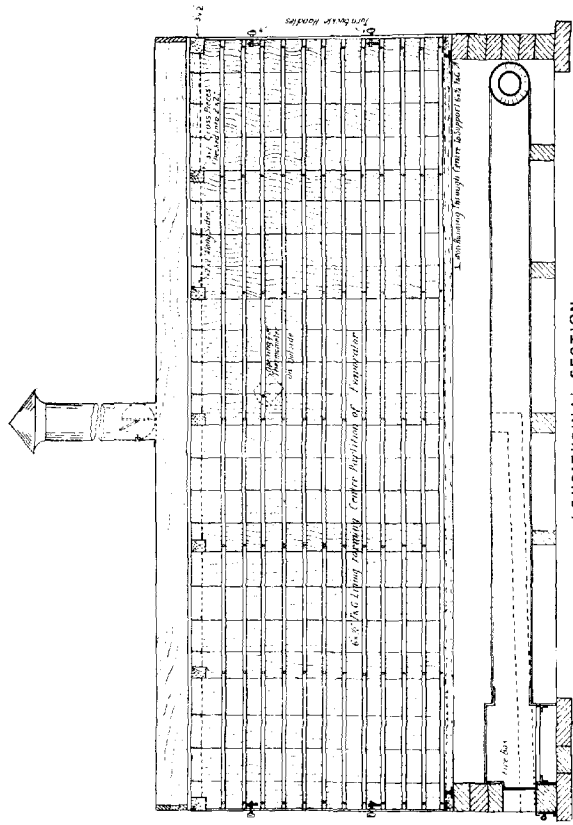
There is no reason why the Commonwealth should not produce almost all the varieties of dried fruits required for home consumption, and also have a substantial surplus for export as well.



GROUND PLAN

Plate 1.

The increase in fruit production is not confined to Victoria alone, the United States of America, Canada, South Africa, and nearer to home, New Zealand, and the other States of the Commonwealth, are all making preparations to increase their fruit producing capacity.



LONGITUDINAL SECTION

Plate 2.

In view of this state of affairs, students of fruit-growing and fruit distribution realize the necessity for careful management of this industry in order that we may avert the impending chaos.

But it may be stated that, in most countries, up to the present, fresh fruit has been regarded as a luxury, and consequently not consumed in such large quantities as it should have been. Fruit, however, when dried, becomes a staple article of food.

The writer received from the Chief Orchard Supervisor (Mr. Carmody) a letter dated 7th July, 1910, inviting contributions as to the utilization of surplus and waste fruits.

And, later, Mr. Carmody again wrote:—"Victoria is rather backward in literature dealing with fruit culture. I am desirous of you preparing a series of articles dealing with 'Apple Culture' in all its details, with abundant and instructive illustrations, for publication in the *Journal of Agriculture*."

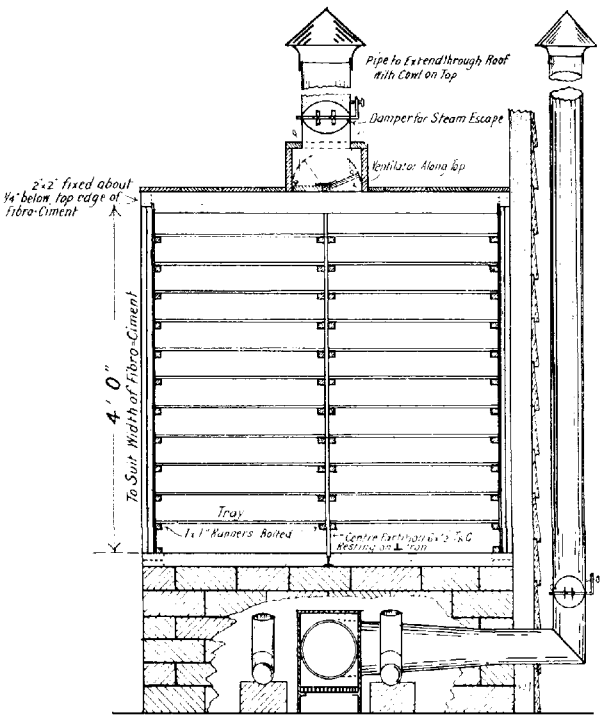


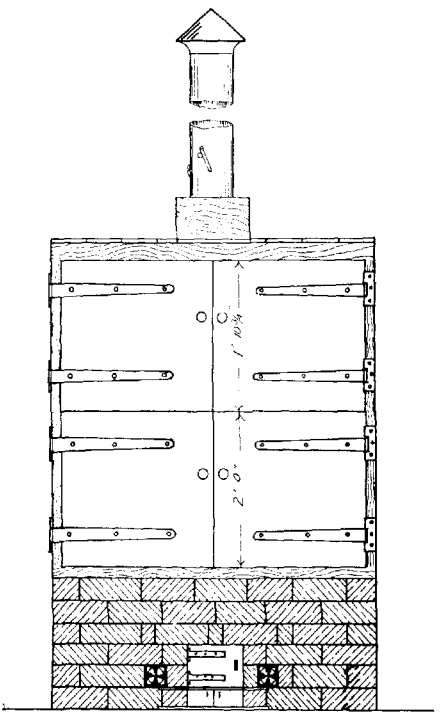
Plate 3.

In consequence of these instructions, a series of articles is being prepared on this subject; but, if published in their proper sequence, this article on fruit-drying would have come last.

Owing, however, to the abnormally heavy crop of apples this year, and the difficulties likely to be met with in marketing same, it has been decided to publish this article first, with a view of pointing out to

the fruit-growers one of the best means of utilizing their unmarketable surplus.

The writer holds that, in order to deal with this phase of fruit-growing properly, it should not be left solely to the management of large drying establishments; but that an evaporator should be regarded as an article of importance in the equipment of every orchard plant, to enable the orchardist and his family to deal with surplus fruit on the spot, and at times suitable to their convenience.



FRONT ELEVATION

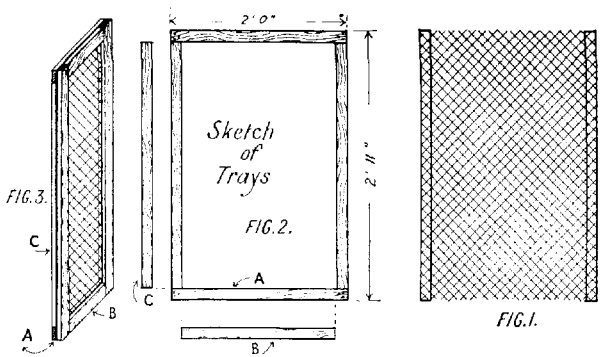
Plate 4.

To meet this requirement, plans—which are original—of an evaporator suitable for this purpose have been drawn, and are figured herewith. This may be constructed to any scale desired, and, taking the one figured as a standard, and allowing that it has a capacity capable of dealing with the surplus fruit in an orchard of 40 acres, the capacity may be reduced or increased when the building is being constructed for use in smaller or larger orchards respectively.

Plate 1. Ground plan of evaporator, showing fire-box, and 8-in. flue pipe, which heats drying chamber, with a reduced outlet to 4½-in. pipe, with a damper to regulate draught and conserve heat. This method of heating the drying chamber reduces fuel to a minimum, and prevents the products of combustion coming into contact with the drying fruit.

While drying is in progress, it is necessary to provide for the admission of fresh air to the chamber, and at the same time maintain, as far as possible, evenness of temperature. For this purpose, instead of employing the ordinary air vents, two 3-in. galvanized iron pipes, 6 feet long, are employed. They are inserted in the brickwork in close proximity to the fire-box; in consequence of this, they are continually heated, and being slightly elevated at the delivery end, the air enters the chamber in a heated condition; this produces the desired effect.

Plate 2. Longitudinal section, shows one course of bricks on the cross as foundation for 4½-in. brick wall, which supports the woodwork, fire-



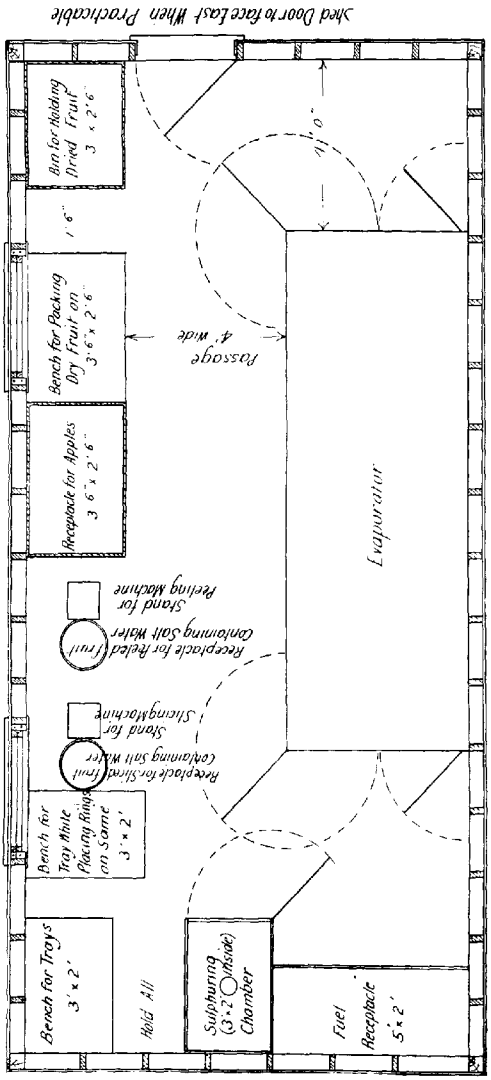
Trays Covered With ½"Galvd Wire Netting 24"Wide Lacquered Stretched on broad Oregon Laths

Plate 5.

box, and 8-in. flue from same, with brick supports. The dotted lines represent the 3-in. vent pipe for the admission of fresh air. Centre partition of 6-in. x ½-in. T. and G. lining forming centre portion of the evaporator rests on ⊥ iron, which runs full length of chamber, and is supported by the brickwork at each end. Damper is shown open.

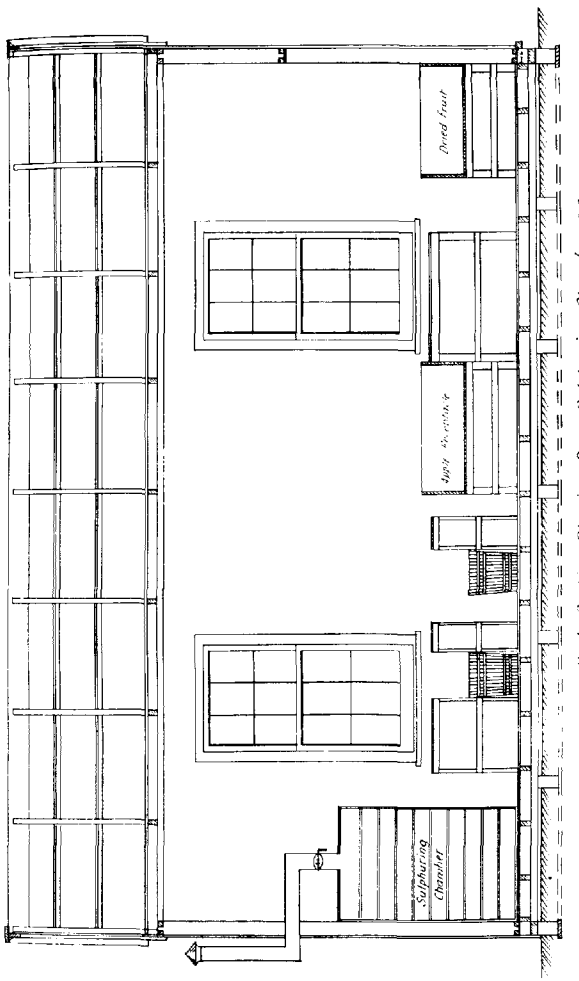
Plate 3. Cross section, shows fire-box, flue pipe, two vent pipes, two chambers for trays, with partition between consisting of ½-in. tongued and grooved wood, resting on ⊥ iron, which runs full length of evaporator, and is supported by the brickwork at each end. The weatherboard wall of shed in which evaporator is erected is also shown.

Plate 4. Front elevation. This gives a view of door of fire-box, cast vent faces of 3-in. vent pipes, position of turnbuckle handles on fibro-cement doors, hinges 18 and 20 inch, the latter so placed on door as to allow same to swing right around so that it may not block up 4-ft. passage, as shown in Plate 1.



— *Ground Plan Shewing Requisites for Drying Plant & Their Arrangement* —

Plate 6.

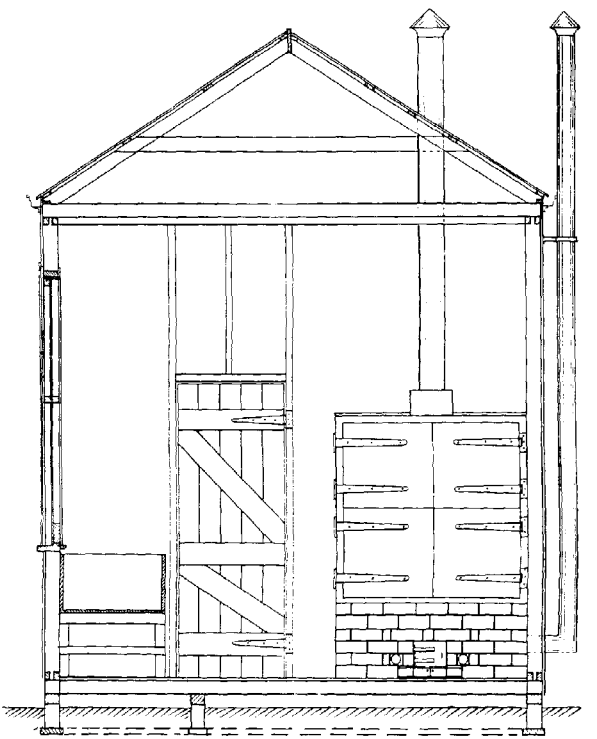


Longitudinal Section Shewing Brs. Sulphuring Chamber &c

Plate 7.

Plate 5. Sketch of trays. This sketch illustrates method of constructing trays. Take a strip of wire netting ½-in. mesh, 2 ft. 11 in. long, by 2 feet wide, and stretch on oregon laths, like Fig. 1; then put covering laths on, as shown in Fig. 2; then follow lettering in Fig. 2 and Fig. 3, and work can be completed without difficulty.

When apple rings are placed on the trays, and dried in the usual manner, there is a tendency for the fruit acid to cause the wire to



Cross Section

Plate 8.

strip; this has a bad effect on the dried fruit, but it may be prevented by painting the trays, before being used, with lacquer, and then placing them in the evaporator; when dry, they will be ready for use.

Plate 6. Ground plan, showing requisites for drying plant, and their arrangement in the drying shed. There is but little explanation

required in this case, as the plan fully explains itself. However, it may be stated that, when the apples are peeled, sliced, treated with brine, and sulphured, the evaporator is charged with the trays at the fire-box end, and they are drawn, when rings are dry, at the opposite end of the drying chamber. The rings are then put into the dried-fruit bins.

Plate 7. Longitudinal section of drying shed, windows facing "north," showing bins, sulphuring chamber, &c. No further explanation needed.

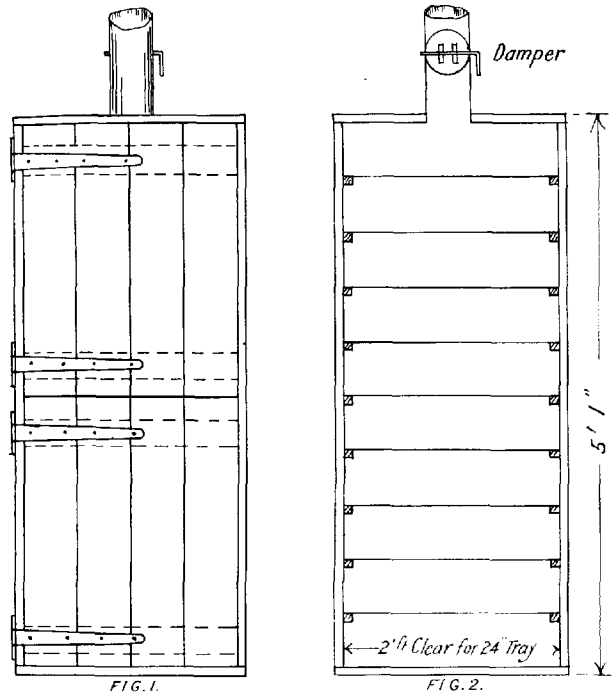


FIG. 1. FIG. 2.

Elevation of Sulphuring Chamber

Plate 9.

Plate 8. Cross section of drying shed, showing position of evaporator, and bin for dried fruit.

Plate 9. Elevation of sulphuring chamber. Fig. 1. This chamber is constructed of wood, with doors closed to show hinges so placed to permit of door swinging right around, for reason previously explained.

Fig. 2. Shows capacity for nine trays, damper open.

CAPACITY OF CHAMBER.

The hot-air capacity of the evaporator above the brickwork is 190 cubic feet, approximately, and, provided the full number of trays (88) are placed in the kiln, and with the fruit in single layer on trays, the surface area of fruit exposed for evaporation, allowing that it dries on both sides, top and bottom, is about 800 square feet; but this area soon becomes reduced as the drying process continues, and the rings become contorted and contracted.

Plate 10.—Peeling machine.

PEELING, CORING, SLICING, AND TRIMMING OF FRUIT.

There are many kinds of peeling and coring machines on the market, but that shown in Plate 10 is one of those most favoured. It is used at Mr. J. Mitchell's drying factory at Wandin, and gives satisfaction. There should be a slot in the machine stand to permit of the skins and cores dropping into a receptacle underneath. The apple, when peeled, drops into the receptacle containing the brine. This machine is so arranged that it can be worked by hand, or power may be applied.

There are three sets of forks, on which the apples are placed, and they revolve at regular intervals, placing the apple in contact with the peeling knife of the machine. There are various slicing machines in

use; the Disc machine is the one generally found in factories. The apple should be sliced into rings of about $\frac{3}{8}$ to $\frac{1}{4}$ inch in thickness.

Prior to slicing, the peeled apples should be taken from the brine receptacle and trimmed, so as to remove any portions of skin missed by the peeling machine, and to pick out any diseased or discoloured parts. Plate 11 shows the make of knife for this work, and method of using same.

Brining and Sulphuring.

The object of placing the peeled apple in the brine is to preserve its colour on the outside, and similar treatment after slicing preserves the whole of the exposed surface. The sulphuring of the rings practically

Plate 11.—Trimming apples.

fixes the colour. Plate 12.—Fig. 1. The apple after peeling, and kept for some time in brine. Fig. 2. Ring salted and sulphured. Fig. 3. Dried ring, perfect colour. Fig. 1 and Fig. 2, after being taken from the salt and sulphur respectively, were kept in paper for several days before being photographed. When peeled apples and rings do not receive the salt and sulphur, or other treatment, but are dried in their natural state, the finished product is of a dark-brown colour, lacks attractiveness, and loses points, compared with the well-coloured rings, in commercial value. Plate 13 shows a specimen of this kind.

To make brine for peeled and sliced fruit, salt may be used at the rate of about 2 ozs. to the gallon of water.

When the apple rings are on the trays, and in sulphuring chamber, light about 2 ozs. of sulphur in an earthenware vessel, and place on floor of chamber. Close doors, and allow sulphur fumes to envelope fruit for from five to ten minutes. There are no standards to be observed in these matters.

DRYING OF FRUIT.

Before charging the kiln, it should be brought up to a temperature of about 200 degrees Fahrenheit. As the trays are placed in the evaporator, the temperature rapidly falls to, perhaps, 120 degrees Fahrenheit, according to the surface area of the fruit exposed to the hot air. When in working order, the temperature may be kept at from 120 degrees to 130 degrees Fahrenheit. Again, there is no standard, but the operator will soon learn what is required. Openings are provided for in the walls of the evaporator for the insertion of the thermometer, which should register up to 300 degrees Fahrenheit.

ORDER OF TREATING VARIETIES.

When commencing to dry the season's surplus apples, the orchardist should begin with the kinds not likely to keep well. For instance,

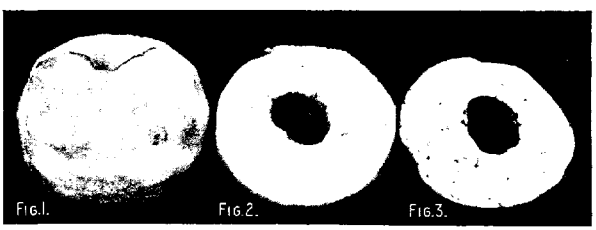


Plate 12.

he would do well by beginning with varieties likely to develop bitter-pit. Then those affected with codlin moth, black spot, &c., might receive attention.

PERCENTAGE OF DRIED FRUIT COMPARED WITH FRESH.

Apples, when dried, produce as a dried product from 10 to 15 per cent. in weight of the fresh fruit, according to the size and quality of the latter.

TREATMENT OF CORES, PEELS, ETC.

The cores and skins may be used for making by-products, such as cider and jelly; or they may be dried as a winter food for stock.

PREPARING DRIED PRODUCT FOR MARKET.

During the process of peeling, coring, slicing, sulphuring, and drying, a high percentage of the rings become broken into particles.

After being dried, the fruit should be stirred occasionally, and allowed to remain long enough in the bin to attain an evenness of moisture. Then pack for market by selecting whole rings. Pack in rows on flat, in neat, white wood boxes, of 28 lbs. capacity. Smaller

lots may be put up in 1-lb. and 2-lb. attractive cardboard cartons—these may be sold as first quality. The particles may be put up similarly, and sold as "Seconds."

Plate 13.

But the writer is of opinion that, if the "Seconds," while dry and hard, were ground into a meal, say to the consistency of flaked oatmeal, and put up in 1-lb. and 2-lb. cartons, and sold as dried apple "meal," they would then not lose any of their commercial value.

Mr. W. Dabb, orchardist, of Croydon, has built an evaporator on somewhat similar lines to this one; and, while it was in course of construction, Mr. Dabb was in consultation with the writer. A few trial lots have been put through, with satisfactory results.

Although this article deals specially with apple drying, it may be incidentally mentioned that this evaporator is capable of dealing with any of the other fruits dried for commercial use.

Rough Outline of Material Required for Evaporator.

Bricks, 440.
Plates, bottom, 4/12 ft., 4/4 ft. 5 in., 3-in x 2-in., H.W.
Cross pieces to carry top, 5/4 ft. 3¼ in., 3-in. x 2-in. H.W.
Top boarding, 8/12 ft., 6-in. x ⅝-in., T. & G.
Vent on top, 1/12 ft., 12-in. x 1-in., shelving.
Vent on sides, 2/12 ft., 6-in. x ⅝-in., T. & G.
Battens at side, 10/4 ft., 2-in. x 1-in., H.W.
Slides for trays, 47/12 ft., 1-in. x 1-in., H.W.
Partition, 24/4 ft. 2⅜ in., 6-in. x ½-in., T. & G.
Fibro-cement, sides and doors, 4½ sheets.
Hinges for doors, 4 pair 20-in., 4 pair 18-in., Scotch tee.
Bolts for door hinges, 4 dozen, galvanized, mushroom head.
Turnbuckle handles, 8.
Wire netting, ½-in., 88 yards, galvanized and lacquered.
Laths for trays, 530, 4 ft. broad.
Bolts for sides and runners, 215, 2¼ in. x 3-16-in.
T-iron to support centre, 11 ft. 8 in., 1¼-in. x 1¼-in.
Flue, 10 ft. of 8-in., 20-gauge, rolled seam.
Flue, 18 in. diminished from 8 in. to 4½ in.
Flue, outside, with damper, 15 ft. — 4½ in., 22-gauge, cowl on top
Vent pipe, inside, 2/6 ft. 3 in., 22-gauge iron.
Fire-box, ⅜-in. in thickness.
Fire bars.
Fire door.
Cast vent faces for 3-in. vent pipe.
Sliding plates for ash pan.
7-in. vent pipe, with damper, on top of evaporator, 22-gauge galvanized iron.

AMMONIA ACCIDENTS AND EMERGENCY RELIEF.

Accidents sometimes occur in the boiler room or engine room of a refrigerating plant. As the result of such accident, an ammonia pipe may be ruptured, and the vapour spreading, may cause painful injury to the person in the immediate vicinity.

To relieve the suffering and aid the recovery of the victims of an ammonia accident, the following suggestions are given:—

For the Eyes.—First: Pour a 1 per cent. solution of pure boric acid into the eyes, instructing patient to open and close the lids rapidly to bring the solution into contact with the entire inner surface. Use solution freely.

Second: After thoroughly washing the eyes, place a small quantity of clean vaseline under the lids by pulling down lower lid and applying the vaseline with a match-shaped piece of wood having smooth rounded ends.

For the Skin.—Apply lint or linen or wasted muslin, dripping wet with carron oil, changing dressing frequently. By keeping lime-water and linseed oil separately a fresh solution may be prepared each time by mixing thoroughly equal parts of the two ingredients.

For Nose and Throat, if inhaled.—Dip a handkerchief folded once into vinegar, wring out lightly, and place loosely over nose and mouth. If liquid ammonia has entered the nose, snuff up some diluted vinegar, and apply sweet oil with feather to the inner surface and nostrils.

If Ammonia has been Swallowed.—Administer diluted vinegar or have patient suck orange or lemon juice in liberal quantities, and follow with one to four teaspoonfuls of sweet oil, milk, or the whites of three eggs and ice. If any vomiting, aid it by giving liberal draughts of luke-warm water.

General Information.—Ammonia vapour is lighter than air, and on being released it rises. Therefore, in the case of an accident, keep your head as low as possible.

On going to the rescue of one overcome with ammonia vapour, keep near the floor, and place a wet sponge or cloth over the mouth.

Keep the following supplies on hand:—

A 1 per cent. solution of boric acid.
A bottle of clean plain vaseline.
A package of surgeon's lint or muslin.
A package of plain gauze.
A bottle of best quality vinegar.
A bottle of sweet oil.

Linseed oil and lime water, to make carron oil.

—Extract from *Refrigerating World*

INSECT PESTS OF THE FRUIT, FLOWER, AND VEGETABLE GARDEN.

AND HOW TO TREAT THEM.

By C. French, Jr., Government Entomologist.

The varieties of insects which attack plants are numbered by thousands; many are distributed all over the world; others, again, are strictly local. At certain seasons, principally in the hot and dry weather, they practically eat everything before them, and in some countries cause famines. Many insects which formerly lived on our native plants have adapted themselves to altered conditions, and now live on cultivated plants. Take, for instance, the apple-root borer, one of the worst pests with which orchardists have to contend. These insects formerly lived on wattles (acacias), but are now the cause of apples, pears, vines, and other plants dying. Another insect, the painted apple moth, which also used to feed on the leaves of wattles, is becoming a serious pest to all kinds of fruits, as well as garden and other cultivated plants. The principal causes for this change of habits are the clearing of land where formerly their natural food plants grew; and the destruction of insectivorous birds, which are often ruthlessly destroyed by boys, or by the poison which is laid for rabbits and other vermin.

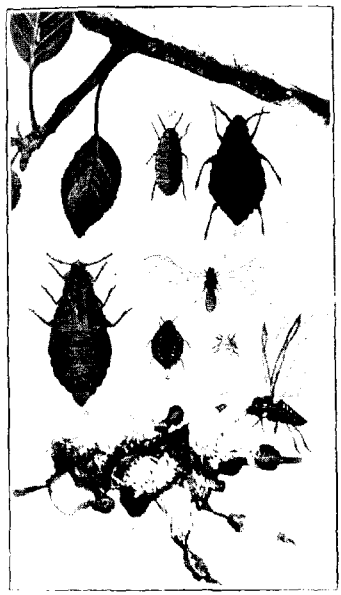


Fig. 1.—Woolly Aphis, or American Blight (*Eriosoma lanigera*).

Unfortunately for Victoria, birds introduced from other countries, the starling and the sparrow, and other species, are the cause of valuable insect-eating birds, as kingfishers, diamond birds, tree creepers, and tree swallows, being driven out of their nesting places in tree hollows; and it will not be very long before these useful birds disappear right out of the State.

The insect pests of our orchards and gardens may be divided into two classes, viz., chewing insects and suctorial insects. The former

should be controlled by internal poisoning, and the latter by contact sprays.

WOOLLY APHIS, OR AMERICAN BLIGHT.

The woolly aphis, or American blight, is one of the most troublesome pests that apple-growers in Victoria have to contend with. It is peculiar in its habits, as it attacks only certain varieties of apples—immune varieties being the Winter Majetin, Northern Spy, Perfection, Paradise, and a few others. The supposed reason of this is, that they contain more carbonate of lime than those attacked by the aphis. It is advisable, therefore, that orchardists should have their trees worked on blight-proof stocks, otherwise the aphis will attack the roots in such a manner as to render the eradication of the pest impossible. All infested trees should be removed, as it is impossible to permanently cure them. The aphides secrete a white, woolly substance, which gives them their characteristic appearance; they attack the trunk and limbs wherever they have been wounded or scratched. Almost all parts of the tree are attacked, and knots and aborted growths are caused. The roots attacked develop great lumps many times the thickness of ordinary roots, and the trees are considerably injured thereby. The root-infesting form can be kept in check by the use of manurial insecticide or tobacco dust worked into the soil. During the winter, or in late autumn, spraying the trees with red oil, kerosene emulsion, lime and sulphur, or fluid insecticide has given good results. Spraying should be done after pruning, and when the trees are bare of leaves. Of course, spraying could be done with advantage at all times, except with the oils.

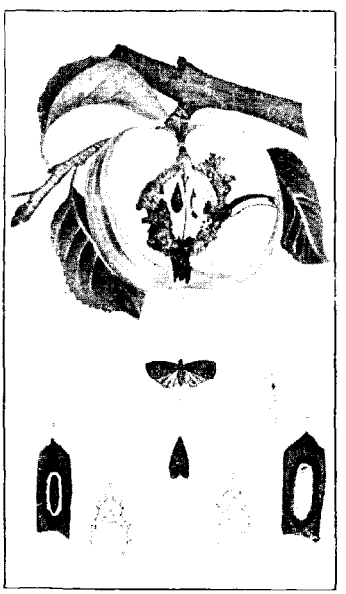


Fig. 2.—Codlin Moth (*Cydia pomonella*).

THE CODLIN MOTH.

This moth, originally a native of Europe, has spread over the whole world, and there are now few countries where apples, pears, and apricots are grown in which this destructive pest is unknown. The female moth places her eggs, as a rule, on the sides of the fruit and leaves. The eggs are thin, transparent bodies, resembling a fish scale. Only one egg is placed on each apple, but as each moth lays over 100 eggs, we may judge the amount of damage done in an orchard. As soon as the

little caterpillar escapes out of its eggshell, it crawls over the apple and when it has reached the eye, it has finished the first stage of its journey. During the first week or ten days after the apple blossoms have fallen, the separate parts surrounding the eye of the apple remain pointing outwards, but later on close up to some extent over the eye. The statement that the majority of grubs go in at the eye has frequently been challenged, but it is nevertheless correct.

The grubs, when fully grown, leave the fruit, and this is done in two ways: the majority lower themselves to the ground, if the fruit has not fallen; others crawl out of the apple on to the branches. Those that fall to the ground re-ascend the tree trunk, and make their way under the first shelter they come to—often under the bark of the apple trees; here they spin cocoons; they then change to the pupæ, and finally the moths emerge in the hot weather. There are supposed to be three broods of this moth, viz.:—(1) The over-wintered or *spring brood*; (2) the *December*, or Christmas brood; and (3) the summer, or February brood. Spraying should be done every few weeks during the season when the moths are present. By a judicious use of arsenate of lead, it is no uncommon thing to get a return of 90 per cent. clean fruit. Spraying, to be successful, must be done properly. As fine a mist as possible must be thrown out, so that it may penetrate well into the calyx of the fruit. Bandages, made of hessian, should be placed round the trees to trap the caterpillars, but these must be removed from time to time, and the grubs and chrysalids found therein killed by boiling water. All loose bark should be removed from the trees.

Fig. 3.—Light Brown Apple Moth
(Cacaecia responsina).

The Light-Brown Apple Moth.

Persons growing flowers, vegetables, and fruit trees have often noticed, especially during the summer months, greenish caterpillars curled up in rose leaves and buds of carnations, dahlias, and chrysanthemums, in fact, in nearly every kind of garden flower. These caterpillars, when fully grown are about 1 inch in length. They are active, and have a habit of dropping to the ground by a silken thread, and hiding in crevices when disturbed. The moth is yellowish-brown, with

slightly barred wings, measuring three-quarters of an inch in length. It is also extremely active, and when disturbed flies to the ground, and remains motionless. The moth deposits its eggs on the young flower buds or fruit, and the eggs hatch in a short time. The young caterpillars at once commence to bore into the flowers or young fruits, and very shortly destroy them. When one bud is eaten out, they leave it and commence on another, and so on until they are fully grown, which usually takes about a fortnight. They then curl up, join a couple of leaves together, and spin a kind of silken web. They next turn into the chrysalis, and hatch out as perfect moths, ready to commence their destructive work in the garden. This pest is very destructive to apples, grapes, &c. I would advise that arsenate of lead be sprayed on the plants. It will poison the caterpillars as soon as they commence to feed. An excellent plan is to place a light on a brick in a dish half-full of water or kerosene at night time in the garden; the light will attract the moths, which will fly against it and fall into the water or kerosene and be destroyed. These caterpillars usually appear in numbers from October to March.

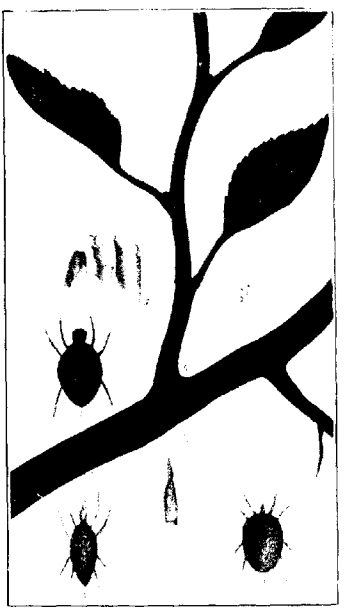


Fig. 4.—Red Spider (*Tetranychus telarius*).

THE RED SPIDER.

The red spider is well known to lovers of flowers. It belongs to the mites, and is, therefore, strictly speaking, not an insect. This species has been found on a great number of fruit trees and on garden and vegetable plants of all descriptions. It is a variable mite, some being almost transparent, others reddish or brick red. When the eggs hatch, the young mites swarm upon the foliage and expanding flowers, and suck up the juices. The plants, vegetables, and other vegetation soon show the influence of their presence by the sickly yellow hue of the foliage. During hot weather, this is one of the worst pests growers of vegetables have to contend with, as they destroy beans, potatoes, pumpkins, and the like. The red spider is not a difficult pest to destroy, as, unlike many other pests, it has no wings, and spreads mainly by the use of its tiny legs. Migration does not extend far from its winter quarters. This makes every growers' problem virtually his own. In other words, if the infestation has always come from a certain fruit tree, plant, &c., proper attention to these will yield results, in spite

of the neglect of his neighbours. The following remedies have been successfully used against these pests: Tobacco water in summer; and, for a winter spray, red oil has given excellent results.

Recent experiments against red spiders on garden and vegetable plants with the insecticide, "Fixo Pest," have been very successful. The plants should be watered slightly before the powder is dusted on the top and underside of the leaves; this prevents the powder from falling from the leaves. The red spiders are usually on the underparts of the leaves, so that the various solutions must be sprayed in an upward direction. Sulphur dusted on the plants may be used with good effect.

The Rutherglen Bug.

The tiny insect called the Rutherglen bug, or Rutherglen fly, is a true plant bug, and it sometimes appears in countless numbers during the hot weather. During November and December, 1915, and January of this year, these bugs have appeared in millions in most parts of Victoria, and have caused growers of fruit, especially peaches and apricots and tomatoes, considerable losses. The insects were also responsible for the falling off in the honey production of the State, simply swarming in the eucalyptus and other flowers, and abstracting the nectar. Fortunately for orchardists and others who have flower and vegetable gardens, these insects only appear in such vast numbers once or twice in ten or more years, it being about eight years since a similar visitation took place. Like all other bugs, it is furnished with a kind of beak, with which it pierces the flowers and fruits. It then commences to suck the juices, the flowers turn dark-coloured, and the fruit shrivels up. The eggs of this bug are deposited amongst rubbish and weeds, or under the soil. This insect can be kept in check by the benzole emulsion or tobacco sprays. The recent experiments of trying to rid the orchards by smudge fires has been very successful in Victoria and elsewhere. When a gentle breeze is blowing, make smudge fires at intervals amongst the trees, and sprinkle a little sulphur on them. Do not place fires too near trees.

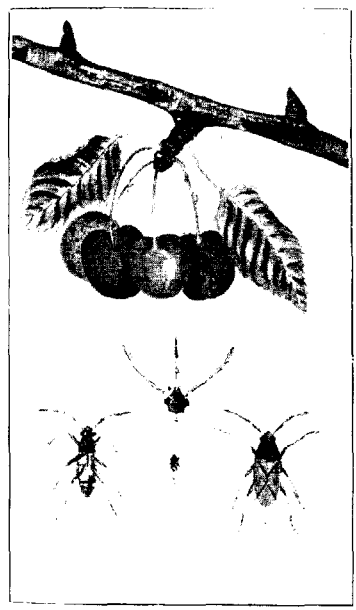


Fig. 5.—**Rutherglen Bug** (*Nysius vinitor*).

According to Orchard Supervisor G. M. Fletcher, the "Phenyle Spray" was used in the Goulburn Valley this season against Rutherglen bugs with good results –

1 quart phenyle.
3 lbs. washing soda.
1 bar yellow soap.
40 gallons water.

The soap is shredded and dissolved in hot water. The other ingredients are added, and the mixture made up to 40 gallons.

(To be continued.)

A NEW PHOSPHATIC ORE.

M. B. De Prolliere asserts in a letter to a French contemporary that he has discovered in one of the departments of France a considerable deposit of a new variety of ore, extremely rich in phosphorus, containing more than 50 per cent. The exact analysis is given as:– Phosphoric acid, 50.10 per cent.; lime, .005 per cent.; silica, 4.75 per cent.; soda, .005 per cent.; free alumina, 8.30 per cent.; combined alumina, 22.80 per cent.; fluorine, 4.15 per cent.; combined water, 5.60 per cent.; loss, 4.79 per cent. The ore was entirely free from potash, iron, and manganese.

An ore of this description should render great service to the chemical industry for the preparation of phosphorus, phosphoric acid, metallic phosphides, and also for the improvement of the manufacture of phosphates.

If it is worth while to extract the phosphorus from bones containing 25 per cent., it should be much more advantageous to obtain it from an inexhaustible ore containing 50 per cent.—Extract *Journ. Ind. & Eng. Chem.*, Dec., 1915.

It is interesting to note that a chemical company has recently been installed in Victoria to work local phosphatic ore deposits. The operations are in the initial stage, but the main product is to be phosphatic fertiliser.

THE wonderful Australian wheat crop, now estimated at 150,000,000 bushels, of a money value of £37,000,000, will give heart to those many people in the Commonwealth who have, by reasons of the war, found existence a hard struggle. It will convince them and the world at large of the splendid country we live in, and that if bad times come they do not last long, and that with good seasons we are capable of an indefinite expansion.—*The Australian Review.*

TREE PLANTING.

For City, Town, and Country.

E. Wallis, Orchard Supervisor.

"The making of a bit of God's earth more beautiful for this and for generations ahead."

The above phrase was coined as the title of a picture portraying the work of transformation done in connexion with the Garden City movement at Hampstead, England, and it may also be used to suitably describe the spirit of the article with which we are now dealing.

A view in Botanic Gardens, Melbourne, Federal Government House in the distance.

The subject of tree planting in all its phases well deserves the earnest attention and consideration of every one desirous of creating and maintaining healthier and better conditions for all the community.

If we reflect upon the appearance of a city, town, or even home surroundings without trees, we shall be able, in some measure, to form an idea of the dreariness and severity of such places, notwithstanding architectural achievements of high merit.

The softening influences of trees in streets, parks, and plantations enhance the skill of the architect, and also have a tempering effect upon climatic conditions. Thus it is recognised that the assets of a city are not merely its buildings, commerce, and industries, but also its GENERAL appearance, which has been rightly termed the "outward and visible

evidence of character." "Show me your city or town and I shall tell you the kind and quality of your citizens" is a rule having very apt application when the subject of tree planting is being discussed.

In the United States of America the various municipal organizations endeavour to make their cities healthful and attractive by means of tree-planted avenues and parks. Washington has its beautiful and artistic buildings, but is not noted for these alone. In fact, its chief glory is its splendid avenues planted with rows—some double—of elms, oaks, Oriental planes, and other trees, which make the city like one great park. Brooklyn also has of late years made rapid strides in tree planting, having over 50 parks in which tree cultivation has been made a special feature; in addition, it has over 150,000 trees in the streets. It was in Nebraska that Arbor Day was first instituted, and its celebration annually is adopted in many countries, being productive of much good by inculcating and encouraging in the minds of both young and old a love for trees.

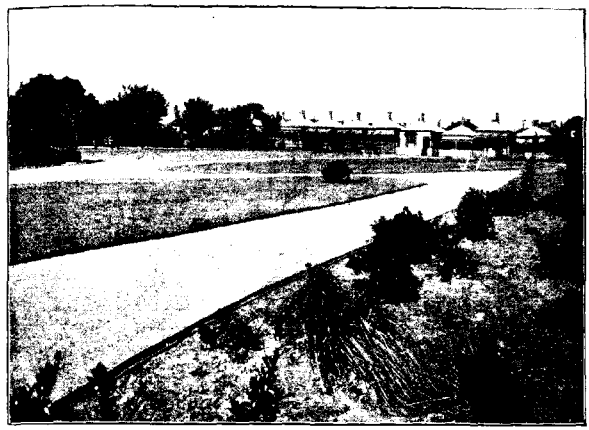
In the vicinity of Melbourne we are very fortunate in having such a fine range of tree-planted park lands, stretching from Albert Park in the south to Royal Park in the north, and including, in addition to these two parks—Fawkner Park, The Domain, Botanic Gardens, Flinders Park, Richmond Park, Fitzroy Gardens, Treasury Gardens, Exhibition Gardens, Carlton Oval, and numerous smaller areas planted in recent years.

To the pioneers who, imbued with intelligence and foresight as well as a realization of their responsibility to posterity, acquired these lands and planted them we are indeed grateful. They did their part nobly and well, and the question naturally arises: Are we doing ours in the same way? It is to be feared not.

If we take the suburbs, say, between the 3 and 5 mile radius, we find that the reserves of tree-planted areas are very limited in extent and far removed from each other. It is satisfactory, however, to note that those in authority have in recent years allowed the public free access to tree-planted strips and small reserves by having the fences removed. This good work is much in evidence along Victoria-parade and other places. Realizing that sufficient lungs have not been provided, attempts are being made in some densely-populated localities to reclaim small areas upon which slum dwellings are erected. Where successful, such as at Collingwood, Prahran, and other places, the land has been purchased, the old buildings demolished, and the limited areas secured have been made more healthful and attractive, by being laid down in grass plots and planted with trees, shrubs, and flowers.

The accompanying illustrations show what may be accomplished in this direction of civic usefulness.

On a summer's evening these reserves, situated as they are in the midst of a thickly-populated locality, are thronged with people—young and old—glad to get away from the stifling atmosphere of their houses, many of which are built on areas of less than 1,000 square feet, *i.e.*, 15 feet frontage by a depth of about 60 feet. Such action as this on the part of those responsible is to be greatly commended. The need of it, and the great difficulties to be overcome, both financial and otherwise, in securing even limited areas, should appeal strongly to municipalities and others, and urge them to secure areas for park purposes while they may.



Reclaimed area, densely populated portion of Prahran, one of Melbourne's suburbs.

A breathing space in a densely populated portion of Collingwood, an industrial suburb of Melbourne (Gahan Reserve).

At the present time outer suburbs, such as places in the Heidelberg shire, do not feel the need of parks, owing to the large amount of vacant land. It is, nevertheless, true that this district contains the smallest area of land actually reserved for park purposes of any of the suburbs. What of the future when such districts are densely populated?

Profiting by our experience in regard to the lack of these essentials to health nearer the city, prompt action should be taken, the necessary land secured, and planted with suitable trees, which, as a rule, take a long time to become thoroughly established.

Generations yet unborn would then have reason to sing our praises for our foresight in providing for their needs. It is, in fact, a sacred duty incumbent upon us to perform.

Our Victorian country cities, towns, and districts generally show evidences of the same spirit which dominated Melbourne's pioneers in their commendable efforts to create a healthy and uplifting environment by tree planting. Many of these country centres have their well-established tree-planted public parks and gardens, while the streets are, in many cases, lined with rows of beautiful trees, as shown in the accompanying plates.

In every newly-established country town or district, or in those places that have not seriously considered the question, a definite system of tree planting, both in street and park, is recommended.

It is a worthy work, not only from a local, but also from a national, point of view, always remembering that, in creating these splendid local assets, we are adding to the assets of the State as a whole, and making for the general betterment of life for all.

"Come forth into the light of things;
Let nature be your teacher.
She hath a world of ready wealth,
Our minds and hearts to bless:
Spontaneous wisdom breathed by health,
Truth breathed by cheerfulness."

Utility of Trees.

Not only is there an uplifting influence in the environment of trees, but from a health point of view they are quite a necessity. Therefore, the more tree-planting is adopted the better for the locality concerned.

Without green leaves we would be unable to exist on account of the accumulation of carbonic acid gas from the exhalations of animals and the decay of organic matter.

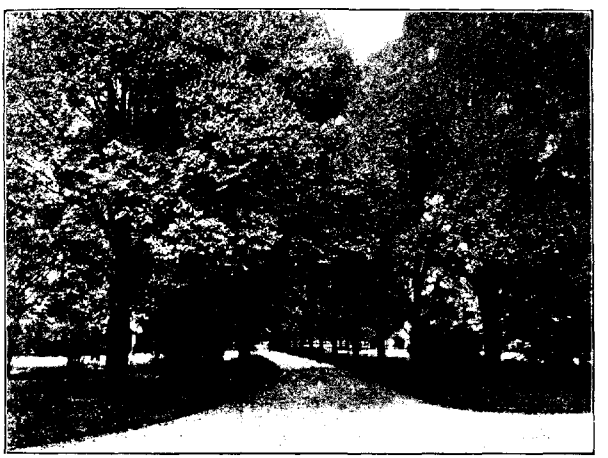
The office of the green leaf, worthily fulfilled, is to absorb the gas mentioned, and after assimilating those essentials to growth and development, to liberate for our use the life-sustaining oxygen.

"Broader and broader yet their leaves display,
Salute the welcome sun, and entertain the day;
Then, from their breathing souls, the sweets repair
To scent the skies, and purge the unwholesome air."

It is, therefore, easy to understand why it is so necessary, even from a health point of view alone, to have plenty of trees growing in densely-populated cities and towns.

The living conditions of city life are also improved by trees in streets, parks, and gardens by their modifying effect upon the temperature and the added comfort to city dwellers in summer time. The heat in city streets is greatly increased by the radiation from pavements and buildings. The foliage of trees not only prevents the direct rays of sun from beating down upon the streets, but also, by giving off large quantities of moisture by transpiration, the temperature is reduced where it is most necessary.

The establishing of wind-breaks is worthy of more consideration from the farmer, grazier, and orchardist than has been given in the past. Who has not been struck with the desolate wind-swept appearance of some homesteads on the plain country in different parts of the Western District of Victoria, where no shelter belts and trees have been estab-



A leafy elm avenue, Fitzroy Gardens, Melbourne (*Ulmus compestris*).

lished? On such holdings in winter time the stock are pinched up owing to their being fully exposed to cold, biting winds, and in summer time there is no place giving relief from either the direct rays of the sun or the shrivelling effects of the hot winds.

By way of contrast, one only needs to see the splendid shelter belts established near Lismore, Skipton, and other places in the Western District to be at once convinced of the greatly improved appearance, added comfort to man and beast, and the consequent enhanced value of the properties concerned, repaying many times over the expense and trouble of planting and establishing the trees.

The provision of shelter from extremes of cold and heat means much to stock, which soon improves in condition, and yields much better returns than under exposed conditions.

Drying winds have a very detrimental effect upon all cultivated land on account of the greater evaporation of moisture from the soil, and, in addition, orchards often suffer badly through the fruit being severely damaged.

Another factor which principally affects the citizens of Melbourne and suburbs is the dust storms in summer time. Not only is great discomfort caused to residents, but it is estimated that the annual losses to shopkeepers owing to injury to goods runs into thousands of pounds. This dust is not of local manufacture, but is, to a great extent, blown in from the parched plains beyond. Its progress citywards is quite unimpeded by the native timber growing on the outskirts of Melbourne's northern outer suburbs, which is mostly redgum, lacking in density of growth and foliage. If, however, a fairly wide belt of trees, such as *Pinus insignis*, or other suitable varieties of trees, were planted from, say, Heidelberg in the east to the north of Essendon on the west, and thence south-west to the sea front, much good would result in mitigating the dust nuisance by breaking the full force of the blow citywards.

The creation of dust is facilitated by wide roads. Even if well kept, the wind has free play and clouds of dust are the result, but this bad condition is made worse when the roadway is not kept in thorough repair.

Roads that are very wide in and near cities and towns should be divided into sections, and these interplanted with trees: St. Kilda-road, Melbourne, typifies this contention with its sections so arranged.

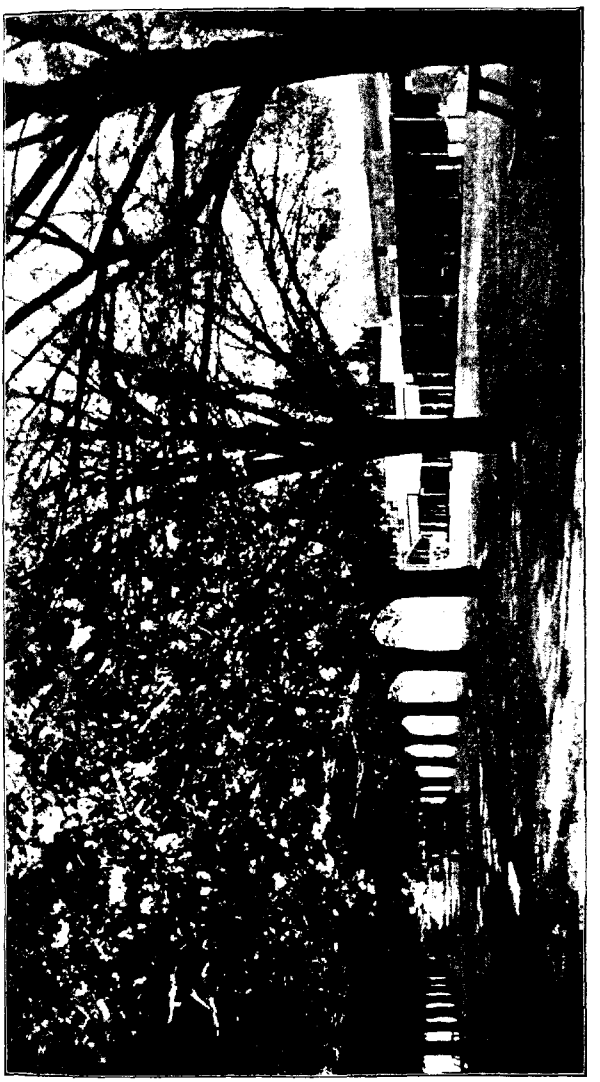
This not only adds beauty to the roadway, but, in addition, the trees provide a breakwind.

Such an arrangement also lessens the cost of road maintenance, and consequently the road surface is kept in a better condition, and the creation of dust minimized.

Selection of Trees.

The choice of suitable trees will, of course, depend entirely upon their allotted position, whether it be in street, park, plantation, private garden, or break-wind. One whose duty is to select trees should be able to see the realization of his objective in, say, twenty, or even fifty years hence. Looking down the perspective of his ideal avenue or street he will see uniformity in every direction—species, distance apart, and general development. Before planting his ideal street trees he will have chosen those varieties having the desirable qualities essential to their well-being. These will include hardiness, which, in the case of street trees, is perhaps the most requisite quality owing to the adverse soil and atmospheric conditions under which such trees have to grow. It is not a case of the survival of the fittest with trees planted in streets, for every tree must be fit and do well. Other necessary qualities for such trees are a clean habit of growth, not making a perpetual state of litter as with some varieties, clean erect stems, power to recuperate after injury or heavy pruning, a fair degree of immunity from the attacks of insects and fungus foes, and a uniform development of crown.

"It has been said that a beautiful boulevard is an unit of a design preconceived, allowing for perfect harmony of arrangement, as in music, where all parts are fitted together to form a harmonious whole."



Elms, Manifold-street, Camperdown.

If all the streets of a town were planted with the same kind of shade tree, or if each were occupied by a mixture, the arrangement would be bad and monotonous; or, on the other hand, if one side of a street were planted with towering elms and the other side with, say, planes, the quality lacking would be individuality, which is most essential to the creation of an environment of imposing grandeur. Mixed planting of avenue trees is undesirable, as it usually creates a patchwork-quilt idea in the observer's mind. Trees of different shape and height with varied hues of foliage suggest natural grouping, and such arrangement should be adopted in the planting of parks and ornamental plantations, but in street planting it is different. The incongruity of a natural arrangement on a city street is easy to understand, as nature did not make the street, neither does she plant trees in straight lines. Avenues of trees are planted because they are useful, but the simple arrangement of an avenue composed of one species or of one variety is also beautiful. Its charm is to be found associated with the things which are naturally dignified in their simplicity.

As we enter such streets or boulevards, call them what we will, varied beauty greets the eye as avenue after avenue, in its arrangement, its mode of growth, and in its utmost simplicity, harmonizes so perfectly with its neighbour as to make discordancy unknown.

The following beautiful and descriptive words have been written on the characteristics of an ideal tree-planted avenue under Canadian conditions:—

"Consider for a moment an avenue composed of four rows of trees, two on each side of the roadway. At all times beautiful, not only in spring with bursting bud, in summer with garb of livid green, or in autumn with russet and gold, but also in winter's mantle of white, for then its beauty approaches the magnificent. Clearly silhouetted against a frosty sky, the very beauty of the trees in their nakedness baffles human expression. Silent as the snow which caresses them, words fail to describe their imperious beauty as queen-like out of the haze they rise to be crowned by the morning sun. An imposing avenue always reminds one of strength, every limb denotes it as it stretches out from the parent trunk in its unconscious grace, every tree in line forming a massive colonnade, silent, majestic, in its very grandeur sublime, and in its sublimity eloquently expressive of its purpose to lead to something dignified."

For street planting it is essential that the choice of varieties be limited to those of a deciduous character. In winter-time such trees allow of the free entrance of sunshine to streets, whilst they are shade-producing during the heat of summer. Surely such arrangement is ideal from an economic point of view.

"From the burning heat of summer
Is offered cool retreat."

To find trees possessing all the desirable qualities which have been enumerated is rather a difficult task, and certainly the range of our choice is limited to a few varieties.

The Oriental Plane (*Platanus orientalis*) probably fills the requirements better than most varieties. It is hardy, resists adverse atmospheric conditions of smoke and dust, is amenable to pruning, and

Oriental Planes. Lyttleton-street, Castlemaine.

Elms, Camp Reserve, Castlemaine.

its recuperative power enables it to make splendid growth and a perfectly symmetrical crown in a single season after pruning. In these days of boulevards and tree planting in connexion with garden cities &c., the Plane finds popular favour, as it did with the Romans and the Greeks many centuries ago. It thrives best in a temperate climate.

Others which possess desirable qualities in a somewhat lesser degree are varieties of the Elm (*Ulmus*), Oak (*Quercus*), and Poplar (*Populus*) families. Perhaps the European Elm (*U. campestris*) and *U. suberosa* are the best of the elms.

The Oak family, although desirable from many points of view, is the host of a troublesome scale insect (*Planchonia quercicola*), which if not eradicated proves fatal to growth and ultimately will kill trees attacked. The Oak thrives best in a cool climate.

The Silver Poplar (*Populus alba*) is worthy of more consideration for street decoration and shade. The opposite page shows a row of these beautiful trees at Sheriff's Bridge, Castlemaine. Both the Poplar and the Elm, in addition to the Oak, like a deep, cool, moist soil.

For park planting the conditions recommended for street trees should apply also to the planting of avenues in parks, with the exception, perhaps, of narrow walks. These should be lined on either side with erect growers such as the Lombardy Poplar (*Populus pyramidalis*). This variety makes a most effective appearance, contrasting strongly with the more spreading varieties. The accompanying plate shows a splendid walk in the Fitzroy Gardens lined on either side with this poplar. The varieties mentioned will also be suitable for general shade purposes.

The requirements of the particular location will, of course, dominate the choice of varieties in other situations. Such qualities as size, shape, colour of foliage, &c., will be considered according to the position and the effect desired. It is also advisable, where possible, to study what trees do well under local conditions of soil and climate. In the hot, dry districts in the northern parts of the State it will be found that the Currajong (*Brachychiton populneus*) and Pepper Tree (*Schinus molle*) do well. The latter, however, is a very gross feeder.

Other trees worthy of consideration in the temperate parts of the State are *Cedrus deodara*, *Cedrus atlantica*, *Cupressus Lambertiana*, *C. Lawsoniana*, *C. torulosa*—the Cupressus family makes splendid wind breaks and tall hedges—*Jacaranda mimosaefolia* (which likes a sheltered position), *Photinia eriobotrya*, Moreton Bay Fig (*Ficus macrophylla*), Silky Oak (*Grevillea robusta*), Norfolk Island Pine (*Araucaria excelsa*), Weeping Willow (*Salix Babylonica*).

Amongst the Acacia group are to be found varieties splendidly effective, both as to foliage and blossom. The latter quality, however, is not quite desirable in a tree for open park planting, but should be considered in protected plantations, and especially in private gardens. The following rank amongst the best of the Acacias:—*A. Baileyana*, *A. elata*, *A. longifolia*, *A. prominens*, *A. pycnantha*, *A. saligna*, *A. spectabilis*, and *A. verniciflua*.

Break-winds and Shelter.—Amongst our indigenous trees—in fact, we may say any trees—the Sugar Gum (*Eucalyptus cladocalyx*) formerly known as *corynocalyx*, stands out as pre-eminently suitable for planting as a break-wind. It is a rapid grower, attaining under favorable

Silver Poplars, Sheriff's Bridge, Castlemaine.

A Poplar Avenue (Lombardy Poplar, *Populus pyramidalis*), **Fitzroy Gardens, Melbourne.**

conditions to a height of over 120 feet. In addition, the tree grows well under arid conditions, is of a shapely habit, and the wood is strong and excellent for construction work and fuel.

The Redgum (*E. rostrata*) is a good tree, both for shade and the excellence of its timber. The deep alluvial flats suit it best, where it attains a great size. In hilly country or that of basaltic nature the growth is more restricted, but still produces splendid shade.

Yellow Box (*E. melliodora*), is suitable as a shade tree in warm districts.

The well-known *Pinus insignis* of California will thrive anywhere. It may be found doing well on the plains or even on the summit of Mt. Macedon (which is a pine forest). As a perfect shelter tree this variety is unequalled. Others suitable for dense hedges are *Cupressus Lambertiana horizontalis, C. torulosa, C. macrocarpa, and Pittosporum undulatum.*

Preparation of Soil.

The future success or failure of newly-planted trees depends to a great extent upon the way in which the preparation of soil is done before planting, and also to the amount of attention given to trees afterwards. Especially so is this the case with street trees, because they have, as a rule, to be planted under the most adverse conditions to successful growth and development.

Where soil is not deep, and, it may be, a hard sole exists, the roots of trees are confined to a very small feeding ground. In addition, the roots cannot penetrate the hard substratum, and the moisture of the lower strata for supporting the growth that languishes for want of it in dry weather cannot pass freely upwards in summer time, nor can an excess as during continuous rains pass freely downwards. Thus the roots of trees may at one period be "standing in water," while at another they may be searching in vain for the moisture they imperatively need, and all through the lack of thorough soil preparation at the outset.

For street planting the digging of holes is not as good as preparing the whole length, which, in addition to giving more room for root ramification, also provides for the draining away of excess water.

The ideal mode of soil preparation for a line of trees is to prepare a strip about 4 feet wide along the whole length to be planted. This, of course, means much extra cost in labour, but it is money well spent considering trees are planted to last for many generations, and the better the work is done the longer will be the life of trees and the better the development. A convenient way of preparing the strip is first to remove a section of the surface soil and lay it aside, then break up the sub-soil as deeply as possible, but do not remove it, and upon this may be placed a layer of organic material, such as leaves, &c. Proceed by placing the next section of surface soil upon the broken-up sub-soil, &c., and so on until the end of the length is reached.

For ordinary planting in parks, &c., square holes 4 feet by 4 feet should be prepared in the same way as advised for street planting.

Gelignite is being used as an agent for stirring up the sub-soil, and the results are being watched with interest.

If the soil is composed of miscellaneous rubbish, as is often found in streets, it is well to remove same from the hole and replace with good fresh soil of a loamy character.

Planting.

As trees of a deciduous character are generally received from nursery with bare roots they should be heeled in at once till ready to plant. If this is not done the roots become dried, and the chances are against the tree doing well.

Before planting, such trees should have all injured roots cut off and tops pruned back to make a proper balance between root and top. If this is not done the transpiration through the leaves will be greater than the absorption through the roots, and as a result the tree will become wilted and die.

Staking is also an important item. Tying to guards is equivalent to staking. Once the roots of a young tree take hold of soil, any interference with the tree in endeavouring to straighten it, or in any other way, will injure the newly formed rootlets to the detriment of tree. Assuming then that the hole and young tree are properly prepared, the stake (if necessary) driven into ground, or the guard fixed, the roots should be evenly spread out with their ends dipping into soil—covered with fine soil—and the hole filled in with sweet surface soil, remembering to plant the tree at its original depth in the nursery.

After Attention.

If trees are planted under the most favorable conditions and do not receive proper after attention their future prospects are anything but bright.

Until the trees become firmly established, and, indeed, afterwards, regular watering is necessary during the summer months; injuries to trees require doctoring; pruning needs attention; and insect and fungus pests must be kept in check. When trees are planted they require a thorough watering to make soil compact around roots, and when hot weather sets in this should be done at regular intervals.

Shade trees, growing in streets, are especially subject to mechanical injuries. Where any part of the tree is injured the affected portion should be cleanly severed in order to allow nature to effect her own repairs by means of that wonderful recuperative capacity singular to the vegetable kingdom. There is a latent power in trees which exerts itself on the trees' behalf when part of the tree is injured. Lost parts may be replaced. This power lies in the fact that the tree has many more buds than can be developed in a single season and which lie dormant till some stimulus is produced either by accident or intention in severing some portion of tree.

The pruning of some varieties is necessary and beneficial. By its means a symmetrical development of crown may be secured, and a stimulus given to growth of the tree, but after it has become established no unnecessary interference by cutting should be tolerated as this often proves to be the beginning of trouble in the way of decay, &c.

Insect and Fungus Pests.

Most trees are the host of some particular insect or fungus pest—perhaps both. In the case of ornamental and shade trees the worst

enemies are scale insects and borers. The oak family is very subject to attack from the oak scale (*Planchonia quercicola*), but this, and, in fact all scales, may be kept in check with the oil emulsions which have become so popular as contact remedies for sucking insects. One of the main principles in the successful treatment of scale and other insects of like nature is not to allow them to become firmly established on trees before attacking them. The strength of sprays used will be governed by the kind of tree attacked—evergreens requiring a much weaker strength than trees of a deciduous character sprayed while dormant.

Vigilance is also required with successful treatment of tree borers. As soon as the first boring is noticed a piece of wire should be inserted into hole and grub removed. If this is not possible a small piece of cotton wool, with a few drops of bisulphide of carbon, should be placed in hole which then requires to be plugged with putty, cement, or plaster of paris.

Bordeaux mixture will rid trees of lichen or any fungus diseases which may attack trees.

Conclusion.

It is thus recognised that trees are essential to our well being, producing as they do health and happiness to all—aptly described "The buildings of God." They are in short not only a local, but also an asset of national importance, whether they be planted in public street, park, or on private land. Therefore tree planting should receive the greatest encouragement from all who realize their duty, not only to themselves, but also to posterity. To walk through our beautiful public parks and gardens, with their delightful shade and ornamental trees, is to be reminded of those men of former days who made tree planting and the beautifying of the landscape their life-work.

It may not be ours to perform such great things as they did, but if we do what we can, in regard to tree planting, both privately and publicly, we shall earn the gratitude of future generations by not failing in our duty to them and to ourselves.

[Some of the illustrations have already appeared in *Journal of Agriculture* for July, 1910, when Messrs. A. W. Crooke and J. Blackburne wrote in a very entertaining and practical manner on a similar subject. —EDITOR.]

RECLAMATION OF PLAIN LAND IN SOUTH GIPPSLAND.

By Temple A. J. Smith, Chief Field Officer.

In the neighbourhood of Foster, and many other parts of Southern Gippsland, there are thousands of acres of land at present put to no useful purpose, excepting that of grazing a few head of cattle. These areas consist of low-lying country covered with ti-tree and small gum scrub—the land in many cases is waterlogged during the winter months. Other portions of the plain country are undulating, covered with a similar growth, and though hilly, are in most cases in need of drainage.

This land, upon appearance, is most uninviting; but, on close inspection, reveals the fact that there is soil present capable of being profitably occupied if the right means were adopted to sweeten and fertilise it.

With this object in view, the matter was taken in hand, and, in October, 1912, the secretary of the Great Southern Agricultural Society wrote to the Minister of Agriculture, requesting that a series of experiments be carried out by the Agricultural Department upon the so-called waste lands in the Foster district. At the same time, a letter was sent from the same source, asking Hon. T. Livingston, M.L.A., member for the district, to support the request.

In September, 1914, the Agricultural Superintendent (Mr. A. E. V. Richardson) visited Foster, and arranged for a variety of experiments to be carried out on 8½ acres of land, which had been placed at the disposal of the Department by Mr. Hugh McDonald, who undertook to drain, clear, and plough the land ready for treatment.

Samples of the soil were taken for analysis, which showed the following:—

Parts in 100,000.

Nitrogen	1,246
Phosphoric acid	41
Potash	59
Lime	60
Magnesia	57
Chlorine	30

Reaction: Slightly acid.

These figures indicated that the soil was rich in nitrogen, and low in all other food constituents.

The nitrogen content, though abundant in quantity, was probably small in availability, and consequently treatments with lime would be necessary to sweeten the soil and liberate the nitrogen. Phosphates were also required to supply the natural deficiency. The chlorine content was high, indicating a larger amount of salt than usual.

The 8½ acres was laid off into seven plots, and lime and manure applied in the following quantities, in May, 1915:—

No. 1.—Ground limestone, 15 cwt.; superphosphate, 150 lbs.
No. 2.—Ground limestone, 15 cwt.; basic slag, 150 lbs.
No. 3.—Ground limestone, 15 cwt; basic slag, 150 lbs.; sulphate of potash, 40 lbs.
No. 4.—No manure; no lime.
No. 5.—Lime, 10 cwt.; superphosphate, 150 lbs.
No. 6.—Lime, 10 cwt.; basic slag, 150 lbs.
No. 7.—Lime, 10 cwt.; basic slag, 150 lbs.; sulphate of potash, 40 lbs.

On this area, the following mixture of grasses was sown across the plots per acre:—

Rye	20 lbs.
Cocksfoot	4 lbs.
White Clover	1 lb.
Cow Grass	1 lb.
Lucerne	2 lbs.

The plots were inspected on the 18th January, 1916, the result of the treatment being satisfactory. All the plots treated with lime and manures showed a good growth of grasses, excepting No. 4, which, contrary to instructions, was first sown with the mixture of grasses as desired, when, as no germination took place, it was treated with lime 10 cwt. per acre. No better success followed the liming, and Mr. McDonald then applied superphosphates 150 lbs. per acre, the seed then germinating and growing well, though somewhat patchy.

The best plots were Nos. 1, 2, and 7. Plots 1 and 7 had been well tramped by the teams during cultivation, which had evidently improved the land by consolidating it.

Noticeable features of the experiment were that, on the lime and superphosphate treated plots, the rye-grass had made the best growth; while the plots treated with lime, basic slag, and potash had the greatest amount of clover growing.

The Rye-grass and Cocksfoot had grown to a height of 12 inches and 15 inches; and the Yorkshire Fog, which had come naturally from a neighbouring plot, had also made good growth. The Lucerne was disappointing, being practically a failure; and the Clovers were, on the whole, poor.

Low-lying patches were poor, and deeper drainage will be necessary in the future for the best results. Heavier liming would also be advantageous, and annual dressings for some years of superphosphate, basic slag, and potash would considerably improve the land for grazing and cropping.

Mr. McDonald estimates the cost of drainage, clearing, and preparing the land at £8 per acre. This is apparently high, and, as the future development of the plain land depends largely on the cost of drainage, clearing, &c., no effort should be spared to reduce expenditure in this direction.

Efficient drainage is the first consideration, and this should be not less than 3 feet deep, at distances best suited to thoroughly rid the land of surplus water. Wide, open drains would probably be best, as they would not be so liable to fall in, and so avoid the necessity for constantly cleaning out. They are also safer for stock, which are often lost through being unable to get out of narrow drains.

Thorough drainage would probably kill much of the ti-tree and undergrowth, and all the surviving green growth could be cut and burned within a couple of years.

One advantage in the plain country, as compared with other somewhat similar land in other parts of the State, lies in the fact that the peaty portions do not burn deeply, generally to a depth of 6 to 10 inches only, immediately beneath which is a useful claybottom. The timber roots soon rot out, and are then easily grubbed and put together for burning. Were the process of draining and clearing spread over a period of about four years, the cost of bringing this land into use should not exceed £5 per acre, which ought to be a good commercial proposition, as the land would probably be worth considerably more than that sum. Possibly, a small syndicate of people interested in reclamation work of this description, with sufficient capital to purchase machinery—such as traction engines, heavy disc ploughs, &c.—might reduce the cost of development still further. The land will continue to improve for many years, and in time should produce good fodder and root crops.

Other experiments in a small way, conducted by Messrs, Wraight and Thomas on plain land, demonstrate clearly that, once drained and cleared, the land will grow good grasses and crops; and the opening up of these areas would be the means of supporting a large population, and adding materially to the wealth of the district.

ANALYSES AND APPROXIMATE VALUE OF FARMYARD MANURES.

Manure.	Nitrogen.	Potash.	Phos. Acid.	Approximate value per ton.
	%	%	%	£ s. d.
Cattle (solid fresh excrement) ..	.29	.10	.17	0 6 6
Cattle (fresh Urine)	.58	.49	..	0 12 6
Hen Manure (fresh)	1.63	.85	1.54	1 14 0
Horse (solid fresh excrement) ..	.44	.35	.17	0 10 0
Horse (fresh urine)	1.55	1.50	..	1 18 0
Sheep (solid fresh excrement) ..	.55	.15	.31	0 10 0
Sheep (fresh urine)	1.95	2.26	.01	2 11 0
Swine (solid fresh excrement) ..	.60	.13	.41	0 10 0
Swine (fresh urine)	.43	.83	.07	0 15 0

The value per ton as given should be taken as the value on the farm. No allowance is made for the organic matter in the manures; in manuring with natural manures this item may be the most important. If the manures are air-dried or rotted with special precautions, the percentages of plant foods increase, with a consequent increase in the value per ton.

The comparative high value of the liquid excrement is well worthy of note. Wherever possible this should be saved, preferably by running it on to an absorbent or the solid manure, and subjecting it to the drying action of the atmosphere.

The value of the mixed manure would be greater than the solid matter only.

SORE SHOULDERS IN HORSES.

A veterinarian gives the following advice for sore shoulders in horses:—A simple application is a lotion made up of zinc acetate 1 drachm, water 1 pint; dabbed on the sore place daily with a piece of cotton wool. This lotion acts as an astringent and antiseptic dressing. When the trouble is more serious, and matter has formed, a preliminary application of tincture of iodine should be made. The best preventives of sore shoulders are cleanliness, good condition of the teams, and well-fitting collars.—*Auckland Weekly News.*

THE SOCIAL SIDE OF FARM LIFE.

By A. Strahan, Editor.

The increasing cry "Back to the Land," in the more densely-populated countries of the world, finds its counter part, even in these newer countries of Australia, where much pioneering work has still to be accomplished. If we examine the census record of Australia we find a great disproportion of rural to city dwellers, the greater number congregating in the capital cities of the Commonwealth. The causes are many, probably the most potent being the amount of money necessarily expended at the seat of government to exploit the inland territories. Consequently manufacturing establishments have sprung into being in these centres, necessitating the employment in various capacities of great numbers of men. The attraction of city life has ever been the lure of the dweller on the land. The more intelligent see the way to easier conditions of life, their children have better opportunities for education, and they themselves enjoy the relaxations of civilization that all crowded cities afford. Of course it can be argued that the city is not as healthful as the country, but in this country at least that factor is probably a more negligent one than in countries which do not possess such a climate as we are fortunate enough to enjoy. Our health resorts do not advertise their hours of sunshine to make them attractive to the weary and holiday seeker. One common luxury enjoyed by city and country dwellers alike in Australia is this self same health bringer, sunshine. We all enjoy it whether we be in the country or crowded city. In one way this places a further burden on those advocating the "Back to the Land" cry, for there is no use in advocating the glorious sunshine of the country against the murk of the city. And so we begin our argument in pushing the claims of country life against those of the city with a heavy handicap. The purpose of this article is not to attempt to prove the impossible; it is frankly admitted that the attractions of city life are all too overwhelming. An attempt is to be made to point a way so that country life may be made much more attractive and appeal to a greater number of people. Let us begin with a maxim. Civilization after all is only a large number of people living sanely and helping each other to resist those natural feelings that make for neglectful living. The starched shirt has more significance than most unthinking people give it credit for. Discipline is the guardian of civilization.

Now that the question of settling those of our returned soldiers on the land is assuming a definite shape, it behoves us to seek means of ameliorating the conditions that a rural life entails. In Australia, in most of the parts, that will be the scenes of the future labours of many of the warriors who have laid down the pen for the sword, and beaten their military weapons into agricultural implements, pioneering work has been accomplished. No longer is it necessary to live hard and to die hard if need be. The factors lacking to make the movement a success are those amenities of civilization that such men have, in a measure, enjoyed before the blue skies and the wide spaces called them. The older generation of pioneers "shunned delights and lived laborious

days," in most cases they knew no other life, but here we are confronted by those who know of other things. A notable example of what may be done to make the rural life brighter and more attractive is furnished by the National Grange of the United States. The Order of Patrons of Husbandry, popularly known as the Grange, was founded in 1867, and has been in existence almost fifty years. It reached the height of its power in 1874, and afterwards declined in influence, and was in the shadow of obscurity until 1880. Since then it has steadily recovered, until to-day it is said to have a membership of 1,500,000. Its temporary collapse was largely due to its endeavour to play a part in the "maelstrom of American politics," and its recovery dates from the time when it began to confine its attention chiefly to various phases of the rural betterment movement.

The aims of the Grange to-day are mainly in the direction of social amelioration and the dissemination of agricultural knowledge. It also takes a keen interest in all educational matters. Its activities include picnics, or dances, where refreshments and all kinds of entertainments are furnished, and where the families of farmers learn to know one another. One of the officers of every Grange Lodge is the lecturer, whose business it is to provide for lectures, papers, and discussions, or all sorts of agricultural and other subjects. The idea with modifications to suit local conditions may be recommended to our farmers. In countries like this, where population is sparse, and homesteads are placed at great distances from one another, the head of the household is apt to forget that, while his own constant occupation with farm work and his keen interest in the development of his property are sufficient to keep him busy and contented, the same does not always apply to the women folk and young people. They feel the monotony and loneliness of rural life. No woman will be happy who does not have reasonable opportunity for intercourse with other women. Young people cannot be expected to settle contentedly in a life where they cannot mix with others of their own age. Perhaps the aims of the American Grange are too ambitious for us to imitate, but it would be an excellent thing if social gatherings of farmers were much more general and frequent than they are at present. The installation of the telephone from homestead to homestead, the establishing of a farmers' club, where both men and women could become members, and definite efforts for making the present meetings of farmers' associations more useful and attractive, are some of the means whereby salvation could be wrought. Papers by members, with discussions, as well as lectures by experts, might be more often arranged, and other members of the family, besides the farmer himself, might be encouraged to attend, with advantage in the social direction. Too frequently three or four farmers travel long distances to meetings, only to find the attendance so small, and the agenda paper so uninteresting, that they feel the time has been almost wasted. An interesting example of what might be done is afforded by the Nhill Pastoral and Agricultural Society which conducts "Farm Competitions" every year with advantage to all concerned. Perhaps it is sufficient to throw out the idea, and if farmers think it over, and are satisfied that there is something in it, they are quite capable of evolving plans to put their wishes into effect.

In many districts the machinery and engine are there, the fuel however is lacking. A competent secretary as engine-driver will soon have the wheels of social life moving.

NOTE ON LAMBS FOR EXPORT.

By A. J. Black, Commonwealth Meat Inspector.

In Victoria, the lamb season generally starts about September or October. If the season has been a good one, and prices favorable, it has started sometimes about August, but more often the former months. It is a noteworthy fact that the first lots of lambs, and they are generally in small lots, arrive in good condition; they kill well, the "bloom" being very noticeable. As the season advances, and the weather becomes warmer, with its usual discomforts—long distances, tightly-packed trucks,* considerable length of time on journey, sometimes two days or more at a "works" before being killed—the depreciation in the carcass is most marked. Lambs that were originally prime, or in good condition, and would have been put into 1st grade—"Approved for Export," find their way into 2nd or 3rd grade—"Passed for Export." There is a double loss. The buyer has to make an allowance for the depreciation that he knows will set in from the time they leave their native pastures and their arrival at the "works"; and if they have to wait for a couple of days before being killed, their depreciation is further accentuated. The difference between the carcass of the early lamb and the "late one," is: The first sets quickly, and in the crossbred, which is the general type of lamb exported, the dry, bright, white colour is intensified. In the "late," it sets slowly, the "bloom" is gone, and the carcass presents a dull, lustreless appearance; and, although freezing bleaches it to a certain extent, there is a difference between the two. The first lamb is carried by the railways in the slack time, and has thus a better opportunity of arriving at its destination in, comparatively speaking, short time. The other is carried in the busy season—the wheat, fruit, and lamb season being on at the one time.† The same sort of conditions prevail in South Australia and New South Wales, and just so long will there be the same possibilities of depreciation. It is pretty safe to assert that 90 per cent. of the rejects among lambs- and during a long, hot spell they are considerable‡—are due to the above-named conditions; and, although plenty of fresh water is always available at works, it is generally in troughs. Lambs will drink from a dam or running water, but they will splash and drink very little from a trough.

In New Zealand, the season starts, in the North Island, about November; and in the South Island, a month or so later, but not in earnest till about March, and continues till August—this is in ordinary years. It is very doubtful if lambs travel a longer distance than 100 miles; there may be isolated instances, but it is certainly not the rule. I am referring to railway journeys—far greater numbers arrive by road than here. The lambs are treated in the winter time,§ thus

* When our winter has been a good one, and the lambing therefore heavy, lambs must be handled in large numbers at the junction of spring and summer, and when placed in close sided, iron and wooden wheat trucks, whether the train is in motion or waiting at a station, the heat in our busiest seasons is intense, and, excepting when works are blocked through strikes, this was the most discouraging feature against quality met with from farms to works.

† In our heaviest lambing seasons, in all sorts of trucks, it is worse still in New South Wales.

‡ Yes; if the lambs are a fairly even lot. In Victoria lambs are bred from all sorts, early and late, and farmers sell everything good and bad for slaughter, selling at a lower rate. I understand in New Zealand such lambs are rejected before coming up to the butcher, and sent to the sale yards, and come later on fit for export.

§ Our lambs are produced in the winter and fattened in the spring and early summer.

there are not the same possibilities of depreciation as in Australia. From the Bluff to Belfast or Islington—the most northerly freezing works, *with the exception of Petone—is between 200 and 300 miles,* and there are in that space ten freezing works. In the North Island, where the distances to be travelled are longer, the heat is not so intense as in Australia; and if my memory is right, the longest distance between freezing works is between Longburn and Petone, somewhere about 100 or 120 miles. If rams were mated about November or December,* the lambs would come in about August or September. This, with the establishment of freezing works† nearer the supply centres, with railways to the nearest port of shipment; shelter or shade at freezing works, with water in dams or races; small paddocks, where the lambs would rest better than in large paddocks; trucks with doors at the end and opening into its fellow, instead of at the side, such as at present, would, I believe, be a step towards a mitigation of the losses that happen pretty well every season in Victoria.

Another matter that might be brought under the notice of the lamb raiser is the characteristics of the various crosses, and the type of ram that ought to be used. As an instance of the value of the latter, let me cite the following:—I had my Christmas holidays with a relation. He reared a few lambs, and was using Romney Marsh rams on ewes the product of Romney Marsh rams and Merino ewes. Now, I think it is generally admitted that the value of the Romney Marsh is: (1) Its immunity from foot rot; (2) The ewes are strong, big-framed, and roomy; (3) They are good mothers. But, from the ram side of the question, they have some of the faults of the Lincoln, certainly in a lesser degree. They do not mature as quickly as other breeds, and the lamb has not that conformation that one looks for in an early lamb.

The Merino is not to be thought of as a cross for early lamb raising, and when mated with any other ram than the Border Leicester,‡ the lamb throws back to the Merino. The most general crosses met with in a freezing works are the Border Leicester and English Leicester.

The former, owing to the smallness of the head§ is less liable to losses *in lambing than the English Leicester—the lamb matures early,* fattens quickly, and is the possessor of a good skin. It is also the coarsest cross; it carries a higher percentage of fat than any other; and is inclined to be leggy, and on this account does not show that nice covering of fat where it is so essential. The English Leicester does not grow and mature as quickly as the Border Leicester, and, in fact, is rather slower all round; yet it does not carry such a high percentage of fat; it has a good skin. The Shropshire, when mated with good, roomy ewes of the Lincoln cross, produces a good lamb, which matures and fattens quickly; but in New Zealand has been discarded a good deal for the Southdown. A very compact, nuggety type of lamb is produced, deep in the shoulders; it has a poor skin, comparatively speaking. The Southdown, when mated with second cross ewes, or large-framed sheep of the Lincoln or Romney Marsh breed, is unequalled

* As a rule only merino and fine crossbred ewes come in season during November and December in Victoria.

† In Victoria the supply of labour has to be considered; it is not available where lambs are produced. In New Zealand butchers and other hands live nearer the works. This work continues over a good part of the year.

‡ Border Leicester more suitable than very woolly, excessively covered merinoes, not necessarily all merinoes.

§ Not so much head, often has deep rugged fore quarters, high wither, and prominent point of brisket, a matter which can be reversed by selection.

for producing early lambs. They are short, compact, fine in the bone, the minimum of fat with the maximum of flesh, and small neck; they mature quickly, and are very prolific; skin, only fair. Their great drawback is, they will not stand a set-back when stinted in feed at the commencement. They will not carry over, as hoggets or ewes, for breeding purposes; yet, in the Hawke's Bay district of New Zealand, they are largely used. The following are the results of an "experiment" held in New Zealand, indicating the maturing qualities of the various breeds:—The Southdown gave 96 per cent. of first-grade lambs; the Border Leicester, 93 per cent.; the Shropshire, 89 per cent.; and the English Leicester, 86 per cent. While the fecundity of the same was:—Southdown, 130 per cent.; the English Leicester, 128 per cent.; Shropshire, 126 per cent.; the Border Leicester, 120 per cent. The comments in the footnotes have been made by Mr. H. W. Ham, formerly sheep expert to the Department to whom the article was referred.

VERNACULAR NAMES OF VICTORIAN PLANTS.

Communicated by Alfred J. Ewart, D.Sc., Ph.D., Chairman, and C. S. Sutton, M.B., Ch.B., Secretary of the Plant Names Committee of the Field Naturalists' Club of Victoria.

Continued from page 186, *Vol. XIV.* (10*th March*, 1916).

Botanical Name.	Popular Name.	Use or Character.
	SYMPETALEÆ HYPOGYNÆ.	
GENTIANACEÆ.		
Villarsia—		
reniformis, R.Br. ..	Yellow Mesh-Flower ..	Might be worthy of cultivation in garden ponds, &c.
Limnanthemum—		
geminatum, Griseb. ..	Large Marshwort ..	
crenatum, F.v.M. ..	Wavy Marshwort ..	
Schœnia—		
ovata, R.Br.	Yellow Schœnia	They all contain more or less a bitter tonic principle, which is sometimes used in domestic remedies.
albiflora F.v.M. ..	White Schœnia	
Erythræa—		
australis R.Br. (spicata), Persoon	Austral Centaury ..	
Gentiana—		
quadrifaria, Blume ..	Dwarf Gentian	
saxosa, Forster ..	Mountain Gentian ..	
LOGANIACEÆ.		
Mitrasacme—		
montana, Hook. f. ..	Mountain Nitrewort ..	Of no known economic value.
serpillifolia, R.Br. ..	Thyme Nitrewort ..	
pilosa, Labill. ..	Hairy Nitrewort ..	
polymorpha, R.Br. ..	Varied Nitrewort ..	
paradoxa, R.Br. ..	Curious Nitrewort ..	
distylis, F.v.M. ..	Tiny Nitrewort	
Logania—		
ovata, R.Br.	Ovate Logania	All more or less worthy of garden culture, more especially L. linifolia.
linifolia, Schlecht. ..	Flax-leaved Logania ..	
floribunda, R.Br. ..	Narrow-leaved Logania ..	
nuda, F.v.M.	Bare Logania	
PLANTAGINACEÆ.		
Plantago—		
varia, R.Br.	Variable Plantain ..	Have a slight pasture value, but are practically weeds.
tasmanica, Hook. f. ..	Tasman Plantain ..	
stellaris F.v.M... ..	Star Plantain	

Vernacular Names of Victorian Plants—*continued.*

Botanical Name.	Popular Name.	Use or Character.
Sympetaleæ Hypogynæ—*continued.*		
Primulaceæ.		
Centunculus—		
minimus, L.	Chaff Weed	Of no known economic value.
Lysimachia—		
salicifolia, F.v.M. ..	Willow Lysimachia ..	Of no known economic value.
Samolus—		
Valerandi, L.	Common Brookweed ..	Of no known economic value.
repens, Persoon ..	Creeping Brookweed ..	Of no known economic value.
Myrsinaceæ.		
Myrsine—		
variabilis, R.Br. ..	Mutton Wood	The wood is yellowish, hard, tough, and durable. The plant is also worthy of a place in our gardens on account of its fine foliage.
Oleaceæ.		
Jasminum—		
linearc, R.Br.	Desert Jasmin	Might be improved by cultivation.
Notelæa—		
longifolia, Vent... ..	Net-leaf Mock Olive ..	Wood hard, close-grained, and firm.
ligustrina, Vent. ..	Privet Mock Olive ..	Wood hard, close-grained; used for mallets, turnery, &c.
Apocynaceæ.		
Alyxia—		
buxifolia, R.Br. ..	Sea-box	Useful for hedges in the coastal districts, also as a garden shrub.
Lyonsia—		
straminea, R.Br. ..	Twining Silk Pod ..	A good climbing plant. The fibre of the bark is fine and strong.
Asclepiadaceæ.		
Sarcostemma—		
australe, R.Br.	Caustic Bush	A reputed poison plant.
Pentatropis—		
quinquepartita, Benth. ..	Purple Pentatrope ..	Of no economic value.
Tylophora—		
barbata, R.Br.	Bearded Wort-flower ..	Of no economic value.
Marsdenia—		
flavescens, Cunn. ..	Yellow Donbah ..	Of no economic value.
rostrata, R.Br.	Stalked Donbah ..	Of no economic value.
Leichhardtiana, F.v.M. ..	Donbah Donbah ..	The milky purple fruits of this plant were eaten by the aborigines.
Convolvulaceæ.		
Convolvulus—		
erubescens, Sims ..	Mallow's-blush Bind Weed	Is apt to become troublesome in arable land.
Calystegia—		
marginata, R.Br. ..	Forest Bindweed ..	Might be improved by garden culture.
sepium, R.Br.	Larger Bindweed ..	Might be improved by garden culture.
Soldanella, R.Br. ..	Sea Bindweed	Might be improved by garden culture.
Dichondra—		
repens, R. and G. Forster	Kidney Weed	Of no known economic value.
Cressa—		
Cretica, L.	Rosin Weed	Of no known economic value.
Wilsonia—		
humilis, R.Br.	Silky Wilsonia	Of no known economic value.
rotundifolia, Hook. ..	Round-leaved Wilsonia ..	Of no known economic value.
Backhousii, Hook. f. ..	Narrow-leaved Wilsonia ..	Of no known economic value.

VERNACULAR NAMES OF VICTORIAN PLANTS—*continued.*

Botanical Name.	Popular Name.	Use or Character.
	SYMPETALÆ HYPOGYNÆ—*continued.*	
CONVOLVULACEÆ—*continued.*		
Cuscuta—		
australis, R.Br. ..	Austral Dodder ..	Parasitic plants, which strangle other native vegetation, but so far do not appear to attack cultivated plants to any great extent, in the way the European dodder does.
tasmanica, Engl. ..	Tasman Dodder ..	
SOLANACEÆ.		
Solanum—		
nigrum, L.	Black Nightshade ..	A troublesome pest in gardens and cultivated grounds.
aviculare, G. Frost ..	Kangaroo Apple ..	The fruit when perfectly ripe is edible and I might be improved by cultivation.
var. vescum, F.v.M. ..	Gunyang	
simile, F.v.M.	Quena	The fruit can be eaten, but in small quantities only.
esuriale, Lindl.	Oondoroo	
xanthocarpum, Schrad. ..	Toothed Nightshade ..	Useless and troublesome plants
pungetium, R.Br. ..	Hairy Nightshade ..	
lacunarium, F.v.M. ..	Desert Nightshade ..	
Lycium—		
australe, F.v.M. ..	Austral Boxthorn ..	Of no known economic value.
Nicotiana—		
suaveolens, Lehmann ..	Austral Tobacco ..	It is a reputed poison plant and possesses narcotic properties like ordinary tobacco.
Anthocercis—		
myosotidea, F.v.M. ..	Small-leaved Rayflower ..	These are suspected poison plants.
albicans, Cunn. ..	Grey Rayflower ..	
Eadesii, F.v.M. ..	Large-leaved Rayflower ..	
SCROPHULARIACEÆ.		
Mimulus—		
gracilis, R.Br.	Slender Monkeyflower ..	Might be improved by garden culture.
repens, R.Br.	Creeping Monkeyflower ..	
prostratus, Benth. ..	Large Monkeyflower ..	
Mazus—		
Pumilio, R.Br.	Swamp Mazus	Of no known economic value.
Morgania—		
glabra, R.Br.	Smooth Morgania ..	Might be improved by garden culture.
floribunda, Benth. ..	Blue Rod	
Gratiola—		
pedunculata, R.Br. ..	Stalked Gratiola ..	Of no known economic value. G. peruviana is a reputed poison plant.
peruviana, L.	Brooklime Gratiola ..	
nana, Benth.	Dwarf Gratiola ..	
Glossostigma—		
Drummondii, Benth. ..	Common Mudmat ..	Of no known economic value.
elatinoides, Benth. ..	Lesser Mudmat	
Limosella—		
aquatica, L.	Common Mudwort ..	
Curdicana, F.v.M. ..	Larger Mudwort ..	
Veronica—		
densifolia, F.v.M. ..	Alpine Speedwell ..	Of no known economic value.
perfoliata, R.Br. ..	Digger's Speedwell ..	Worthy of garden culture.
Derwentia, Littlejohn ..	Derwent Speedwell ..	
nivea, Lindl.	Mountain Speedwell ..	
gracilis, R.Br.	Slender Speedwell ..	
distans, R.Br.	Coast Speedwell	
calycina, R.Br.	Cup Speedwell	Of no known economic value.
plebeja, R.Br.	Eastern Speedwell ..	
notabilis, F.v.M. ..	Forest Speedwell ..	
serpillifolia, L.	Thyme Speedwell ..	
peregrina, L.	Wandering Speedwell ..	
Euphrasia—		
collina, R.Br. (E. Brownii)	Purple Eyebright ..	Parasitic on roots of grasses, &c.
scabra, R.Br.	Yellow Eyebright ..	
antarctica, Benth. ..	Alpine Eyebright ..	

VERNACULAR NAMES OF VICTORIAN PLANTS—*continued.*

Botanical Name.	Popular Name.	Use or Character.
SYMPETALEÆ HYPOGYNÆ—*continued.*		
OROBANCHACEÆ.		
Orobanche— cernua, Loefl.	Common Broomrape ..	Of no known economic value.
LENTIBULARIACEÆ.		
Utricularia— flexuosa, Vahl.	Yellow Bladderwort ..	Semi-aquatic plants of no known economic value.
lateriflora, R.Br. ..	Tiny Bladderwort ..	
dichotoma, Labill. ..	Purple Bladderwort ..	
Polypompholyx— tenella, Lehm.	Tender Bubble Plant ..	
GESNERIACEÆ.		
Fieldia— australis, Cunn. ..	Fieldia..	Worthy of garden culture.
BIGNONIACEÆ.		
Tecoma— *australis, R.Br ..	Wonga Tecoma ..	One of our finest climbers, well worthy of garden culture.

(*To be continued.*)

CARE OF HARNESS.

Proper care of harness is a needed economy on many farms. It should be hung up in a dry shed when not in use, and not thrown down on the ground, as is often the case. Twice a year, at least, it should be thoroughly washed and dressed with neatsfoot oil. A good dressing for black harness can be made from 2 lbs. mutton suet and 3 lbs. beeswax, melted over a slow fire. 4 lbs. sugar, 2 lbs. lamp black, 2 lbs. soft soap, and ½ lb. indigo powder. When the whole has been thoroughly mixed, half a gallon of oil of turps should be added. If the harness is brown the lamp black and indigo powder can be left out. Copper rivets have their place as a means of repairing harness, but it is a mistake to put these in some places where stitching is necessary. Collars should be well fitting, and it is essential to hang them up when not in use. While there is little danger of sore shoulders when a hard, well-fitting collar is used, if the lining becomes broken it should receive immediate attention. It is better to put a pad above and below a sore than to cut a hole in the collar, but when this has to be resorted to it is advisable to sew the lining so that the body of the collar is kept firm.—*Auckland Weekly News*, 24th February, 1916.

BEE-KEEPING IN VICTORIA.

By F. R. Beuhne, Government Apiculturist.

XXV.—THE HONEY FLORA OF VICTORIA *(continued).*

(*Continued from page* 177.)

THE BLOOD WOOD (*Eucalyptus corymbosa*, Smith).

(Fig. 45.)

The Blood Wood is a tree not easily confounded with other species. It attains a maximum height of 150 feet, but is often of much lower and sometimes stunted growth, flowering already when scarcely beyond its early shrubby stage.

The bark is persistent furrowed, of a reddish colour, inside fibrous, but rather flaky than stringy, outside rough, grey, and turning black. Bark of the upper branches smooth, and often reddish. The tree exudes kino (gum) abundantly, the whole stem being sometimes covered with this reddish blood-like substance, and hence its popular name.

The timber has a deep red fleshy colour, is porous, and has numerous gum veins; it is easy enough worked when fresh, but becomes very hard when dry. It lasts well underground, and is resistant to termites (white ants), and teredo (sea worm). It is used in fencing and for piles and railway sleepers.

The leaves are scattered on slightly angular branchlets. The leaves vary in size up to 9 inches long and 2 inches broad, of firm consistence, lance-shaped, somewhat curved, or slightly sickle-shaped, paler on the under side, veins very numerous, and very fine, only slightly oblique, the marginal vein close to the edge of the leaf.

The flower clusters occur in sprays forming a nearly flat top, rarely singly at leaf-shoulders, or lateral on branchlets on slender, slightly compressed or angular stalks, bearing three to nine rather large flowers. Buds nearly 1 inch long with flower cup tapering into the stalklet, and a half-round, short, pointed lid. Fruit about 1 inch long more or less urn-shaped, not angular, three or oftener four celled.

The Blood Wood is found in Victoria only in the far eastern part, in the vicinity of the Genoa River.

No Victorian data are available as to its honey-producing value, owing to it not occurring in any present bee-keeping localities. It is, however, considered of some importance by New South Wales apiarists.

THE CANDLE BARK GUM (*Eucalyptus rubida*, Deane and Maiden).

(Fig. 46.)

This tree is also known as Flooded Gum, Bastard White Gum, Ribbony Gum, and Drooping Gum. The name Candle Bark is in reference to the smooth and sometimes frosted or chalky bark of the trunk.

The bark is perfectly smooth for the most part, the outer layers falling off in ribbons. It frequently shows reddish or plum-coloured patches, hence the specific name, "rubida." This colouration, which is generally most conspicuous at the end of summer, is, at times, beautiful when viewed from a distance, ranging from pale salmon colour to bright crimson and purple.

The mature leaves are dull green on both sides, narrow, lance-shaped, and of thickish texture. The veins of the leaf roughly transverse the marginal vein close to the edge. They are often frosted with a whitish bloom. Sucker leaves from nearly round to oblong blunt ended, they are opposite, often stem-clasping, and even sometimes opposite leaves more or less joined round the stem. The buds are egg-shaped, in threes,

Fig. 45.—The Blood Wood (*Eucalyptus corymbosa*, Smith).

arranged in the shape of a cross, as in the Manna Gum (*E. viminalis*) on short stalklets. Lid of the bud nearly half when mature, hardly pointed. The fruit is top-shaped, spreading at the mouth, sometimes nearly half round, shining or frosted, three or four celled. The timber is red when fresh, but dries pale; it is of little use.

In general appearance, adult leaves and fruits of this tree closely resemble the Manna Gum (*E. viminalis*), in the company of which it is often found. The Manna Gum, however, does not show the colouration of the bark of the Candle Bark Gum, and the latter has round to oblong sucker leaves of lighter green than the lance-shaped sucker leaves of the Manna Gum.

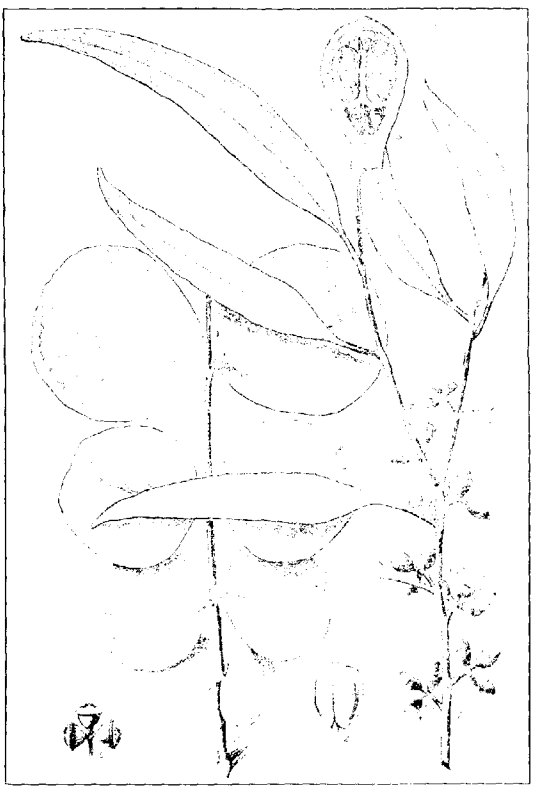


Fig. 46.—The Candle Bark Gum (*Eucalyptus rubida*, Deane and Maiden).
[From Proceedings of the Linnean Society, N.S.W., 1899.]

The Candle Bark Gum blossoms in most localities in January and February, usually a little before the Manna Gum, when the two occur in the same locality. Like the Manna Gum, it is in bud from twelve to fifteen months, two generations of buds being therefore in sight just before it blooms. It yields pollen as well as nectar, and the honey, so far as is known, is identical with that of Manna Gum.

The Sallow Gum (*Eucalyptus camphora*, R. T. Baker).

(Fig. 47.)

A small tree, about 20 to 40 feet in height, with a black, shedding bark. Mature leaves, egg-shaped long, abruptly pointed, under 4 inches long, or lance-shaped, pointed, and 6 inches long, somewhat leathery and frosted. The veins are distinct, particularly in young

Fig. 47.—The Sallow Gum (*Eucalyptus camphora*, R. T. Baker).

[From R. T. Baker and H. G. Smith, "Research on the Eucalypts, &c."]

leaves, the marginal vein away from the edge. The sucker leaves are egg-shaped (2, 3, 4, Fig. 47), blunt, under 6 inches long, and 3½ inches wide, on angular stalks ½-inch long, leathery, and frosted. The clusters of flowers are few, on flattened stalks at shoulders of leaves, bearing five or six short-stalked, top-shaped, and pointed buds.

The Sallow Gum is usually found in company with the Black Sallee (*E. stellulata*) and the Swamp Gum (*E. paludosa*).

From the Black Sallee it is easily distinguished by its leaves, although otherwise in appearance of growth, branches, bark, &c., the two resemble each other somewhat. Its branches, however, never have that yellow, green colour, which is so characteristic of the Black Sallee (*E. stellulata*), but are of an ashy grey or brownish grey colour, sometimes approaching to a sooty black. From the Swamp Gum (*E. paludosa*), the Sallow Gum is distinguished by the leaves being broader, and more oval, with the end blunt; the leaves on the higher branches approach in shape more those of Yellow Box (*E. melliodora*) than those of any other species.

Incidentally it may here be mentioned that the Swamp Gum (*E. paludosa*) is not essentially a wet ground species, as it also occurs on dry ground, but it grows to a larger and straighter tree than the Sallow Gum.

The Cider Gum (*Eucalyptus Gunnii*, Hook, F.)

A shrub or small tree found in Victoria only at high elevations in the north-eastern part, attaining a diameter of 12 inches, and sometimes a height of 30 feet.

The specific name Eucalyptus Gunnii is now only applied to this species, but formerly included the Swamp Gum (*E. paludosa*), the Sallow Gum (*E. camphora*), and the Dwarf Gum (*E. Kitsoni*), all of which are now recognised as distinct species.

The bark of the Cider Gum is smooth. A number of stems spring from a broad expanded root base, a feature which is characteristic of this species.

The leaves are frosted, and variable in size and shape, stem-clasping, stalkless, heart-shaped, round, egg, or egg lance-shaped, and occur opposite or alternate on the rounded branchlets. The lateral veins of the leaves are oblique spreading, the marginal vein well removed from the edge of the leaf. Flowers at shoulders of leaves in short tufts, in threes on a short stalk or stalkless, buds bell-shaped, with short pointed lid, which overlaps the lower part of the bud. The fruit is half-round to cylinder-shaped, with a thickened rim.

A pale-coloured wood. This tree is called Cider Gum on account of a cider-like beverage having been made from the sap.

The Dwarf Gum (*Eucalyptus Kitsoni*, Luehmann and Maiden).

A dwarf tree. It usually does not grow higher than 4 to 5 feet, but at Foster it is found 18 to 20 feet in height. Bark smooth in texture, and ashy grey in colour, lighter in the higher branches.

Juvenile foliage oblong to broadly lance-shaped, with very short stalk, or stalkless leaves, rounded at the end, or terminating in a blunt point, even-sided, and of leathery texture. Veins well marked, spreading marginal vein a considerable distance from the edge of the leaf.

Mature Foliage.—When in the flowering state, this tree has sometimes a few oblong lance-shaped leaves, but they vary in all degrees of width up to 4 inches long by ½-inch wide. Fully developed leaves have the marginal vein close to the edge, and are on stalks up to 1-in. long. Buds with conical lid, the flower cup on a broad (strap-shaped) stalk. Flowers in a head of usually seven, but may be as few as three. Fruit half-round, or more or less conical through mutual pressure, smooth or slightly angled, three, four, or five celled.

The Dwarf Gum grows in poor, boggy country in the low-lying tracts, but also occurs in the drier hills at Foster. The oil of this species is valuable.

The Neglected Gum (*Eucalyptus neglecta*, Maiden).

A dwarf tree like the one previously described, and closely allied to it. It differs, however, from the Dwarf Gum, having broader leaves, smaller, and less angular buds and fruits. It grows in swampy places near the Great Dividing Range, at Omeo.

(To be continued.)

SCIENCE AND AGRICULTURE: A REMARKABLE DISCOVERY.

London papers are publishing a description of a remarkable process by which the vitality of plants has been enormously increased, under experimental conditions, and it is claimed that the process is quite applicable to the production of food on a large scale. Here is the description of what has been done, and probably a great deal more will be heard of the discovery in the near future:—

In a wooden box filled with moss, on the roof of King's College, in the Strand, potatoes are in full growth in October.

Some weeks previously a box, 16 inches long, 6 inches wide, and 4 inches deep, was filled with moss and planted with four potatoes. Once every week the moss was watered with an extract from the bacterized peat, the discovery of which Professor W. B. Bottomley recently described to the British Association. The box, after eight weeks' growth, was as full as it could be of fine new potatoes. Given a little sun, there is no reason, he says, why these vegetables should not be grown in a similar way, not only on the roof, but in one's room if necessary, almost all the year round.

In many cases the size of plants has been doubled and trebled by this treatment. Radishes and tomatoes have even been grown in pure sand watered with the peat extract. Seventy-two cucumbers, weighing 1 lb. each, have been cut from eighteen treated plants after a twenty days' growth, and sold at Covent Garden before those grown in the ordinary way were ready to cut. Sixteen pounds of tomatoes have been taken from one tomato plant. Similar examples of extraordinary growth could be multiplied by the score.

Some time ago Professor Bottomley began these experiments in promoting plant growth by inoculating the soil with the culture of bacteria obtained from the root nodules of leguminous plants. It was found that in soil so treated more nodules were produced in the roots, and that the nitrogenous material in the earth was greatly increased. If the cultures contained humus—that is to say, the black, decaying matter that is found in the soil, they did better still.

"What we then wanted," Professor Bottomley said, "was a source of soluble humus, and we discovered it in peat. We found that by treating peat with special bacteria it was rendered soluble and formed an excellent medium for the growth of nitrogen-fixation organisms."

An important question is whether the discovery can be used for greatly increasing our home-grown food supply. We have seen what it does for vegetables. Will it do as much for wheat?

"There is no reason why it should not," was Professor Bottomley's reply to this question, "if the discovery is taken up and organized on a sufficiently large and authoritative basis. With a definite agricultural policy on the part of the Government, for example, home-grown crops would reap an enormous benefit.

"The whole point is this," he explained. "There are thousands of acres of poor land which could produce plentifully if provided with plant food, and there are, in Yorkshire, in Somersetshire, in Devonshire, and in Ireland, thousands of acres of peat now practically useless, which, by bacterial treatment, could be converted into a rich manure, capable as experiments have shown, at least of doubling the productiveness of the soil.

"Incidentally, it would give Ireland a new industry, for with its practically inexhaustible supplies of peat that country could provide all that would be required for the whole of the rest of the United Kingdom. I am told of one bog alone of 800 acres, where the annual charge is only £20, from which as much peat as one wanted could be obtained.

"Besides the value of peat that has been shown by these experiments there is the fact that ordinary stable manure has been trebled in price in the last two years, and that it is difficult to obtain."

The Government, it is interesting to add, are apparently alive to the importance of the discovery, for they have made a grant to King's College for the purpose of further investigation. Time, however, will be lost if the years are allowed to pass in experiment. The present is the moment for definite action.—*The Farmer's Gazette.*

PROTECTING GUARDS FOR WATERING STOCK.

After trying most kinds of guards for protecting troughing for watering stock, the following has been found to be the most effective and least dangerous:—Put in a row of posts (if split, trim off the splinters) 2 feet in the ground and 10 feet apart, as close as possible alongside the side of the troughing, with a strainer 3 feet in the ground at each end. Have the posts high enough to allow a No. 6 galvanised wire to be run through, so that the wire will be 16 inches above the top of the troughing. Place a good stay at each end, and morticed into the strainer, and strain tightly. The wire so placed will allow sheep to drink under and big stock over the wire. If stock are to drink on each side of the troughing, have the guard on each side.—*Auckland Weekly News.*

FIFTH VICTORIAN EGG-LAYING COMPETITION, 1915-1916.

Commenced 15th April, 1915; concluding 14th April, 1916.

CONDUCTED AT THE BURNLEY SCHOOL OF HORTICULTURE.

Six Birds. Pen No.	Breeds.	Owner.	Totals. 15.4.15 to 14.2.16	15.2.16 to 14.3.16	Eleven months.	Position in Competition.
		LIGHT BREEDS. WET MASH.				
38	White Leghorns ..	G. McDonnell	1,427	130	1,557	1
34	,, ..	H. McKenzie and Son ..	1,405	119	1,524	2
42	,, ..	W. M. Bayles	1,376	129	1,505	3
2	,, ..	E. A. Lawson	1,368	83	1,451	4
19	,, ..	L. G. Broadbent ..	1,350	89	1,439	5
8	,, ..	C. J. Jackson	1,329	96	1,425	6
23	,, ..	Fulham Park	1,290	127	1,417	7
5	,, ..	J. J. West	1,282	130	1,412	8
59	,, ..	W. G. Osburne	1,285	123	1,408	9
30	,, ..	A. E. Silbereisen ..	1,278	110	1,388	10
28	,, ..	R. Lethbridge	1,270	110	1,380	11
54	,, ..	W. H. Clingin	1,254	125	1,379	12
6	,, ..	J. H. Gill	1,257	106	1,363	13
7	,, ..	Marville Poultry Farm ..	1,283	73	1,356	14
16	,, ..	N. Burston	1,244	106	1,350	15
50	,, ..	John Hood	1,215	122	1,337	16
39	,, ..	W. M. Sewell	1,226	106	1,332	17
18	,, ..	D. Adams	1,212	107	1,319	18
6	,, ..	F. Doldissen	1,216	101	1,317	19
44	,, ..	Mrs. F. M. Oliver ..	1,202	114	1,316	20
9	,, ..	J. Schwabb	1,231	82	1,313	21
11	,, ..	J. B. Brigden	1,219	94	1,313	
58	,, ..	Thirkell and Smith ..	1,195	117	1,312	23
21	,, (5 birds)	E. B. Harris	1,252	56	1,308	24
27	,, ..	J. A. Stahl	1,199	109	1,308	
4	,, (5 birds)	R. Hay	1,194	93	1,287	26
26	,, ..	A. Mowatt	1,197	90	1,287	
22	,, ..	S. Buscumb	1,158	128	1,286	28
20	,, ..	R. W. Pope	1,187	98	1,285	29
32	,, ..	F. Hodges	1,183	102	1,285	
13	,, ..	T. Hustler	1,186	96	1,282	31
15	.. ..	H. N. H. Miramis ..	1,162	116	1,278	32
10	,, (5 birds)	A. E. Tuttleby	1,187	86	1,273	33
43	,, ..	H. I. Merrick	1,175	93	1,268	34
1	,, ..	Mrs. H. Stevenson ..	1,182	85	1,267	35
24	,, ..	Lysbeth Poultry Farm ..	1,166	86	1,252	36
49	,, (5 birds)	Bennett and Chapman ..	1,168	61	1,229	37
33	,, (4 birds)	A. W. Hall	1,141	83	1,224	38
36	,, ..	Weldon Poultry Yards ..	1,129	92	1,221	39
55	,, ..	W. N. O'Mullane ..	1,117	95	1,212	40
60	,, ..	H. C. Brock	1,113	92	1,205	41
41	,, ..	J. A. Donaldson	1,102	91	1,193	42
12	,, ..	H. Heyman	1,089	102	1,191	43
46	,, ..	R. Berry	1,080	108	1,188	44
48	,, ..	C. J. Beatty	1,109	71	1,180	45
53	,, (5 birds)	W. G. Swift	1,123	49	1,172	46
25	,, (5 birds)	Giddy and Son	1,117	49	1,166	47
52	,, ..	A. A. Sandland	1,052	104	1,156	48
40	,, ..	C. C. Dunn	1,064	82	1,146	49
47	,, ..	J. C. Armstrong ..	1,093	49	1,142	50
37	,, ..	A. Ross	1,028	104	1,132	51
45	,, ..	South Yan Yean Poultry Farm	1,017	93	1,110	52
57	,, ..	B. Mitchell	1,004	71	1,075	53
14	,, (5 birds)	W. Flood	996	77	1,073	54
31	,, ..	L. McLean	962	91	1,053	55
56	,, (5 birds)	C. Hurst	903	82	985	56
		Total	66,249	5,383	71,632	

FIFTH VICTORIAN EGG-LAYING COMPETITION, 1915-16—*continued*

Six Birds. Pen No.	Breeds.	Owner.	Totals. 15.4.15 to 14.2.16	Totals. 15.2.16 to 14.3.16	Eleven months.	Position in Competition.
		LIGHT BREEDS. **DRY MASH.**				
80	White Leghorns ..	W. H. Robbins	1,418	123	1,541	1
68	,, ..	H. McKenzie and Son ..	1,367	123	1,490	2
76	.. ..	A. A. Sandland	1,243	121	1,364	3
79	.. ..	Lysbeth Poultry Farm ..	1,250	113	1,363	4
63	.. ..	A. H. Padman	1,234	121	1,355	5
62	.. ..	Benwerren Egg Farm ..	1,218	90	1,308	6
67	.. ..	C. C. Dunn	1,175	112	1,287	7
65	.. ..	Thirkell and Smith ..	1,170	97	1,267	8
60	,, ..	E. MacBrown	1,203	61	1,264	9
66	,, ..	E. A. Lawson	1,174	89	1,263	10
61	.. ..	Mrs. H. Stevenson ..	1,156	106	1,262	11
72	,, ..	Mrs. E. Zimmerman ..	1,155	89	1,244	12
71	,, ..	Moritz Bros.	1,160	79	1,239	13
78	,, ..	H. Hanbury	1,113	90	1,203	14
73	,, ..	C. L. Lindrea	1,057	108	1,165	15
64	,, (2 birds)	W. M. Bayles	1,104	46	1,150	16
77	.. ..	South Yan Yean Poultry Farm	1,002	107	1,149	17
74	,, ..	J. H. Gill	893	77	970	18
75	,, ..	Fulham Park	868	69	937	19
		Total	22,060	1,821	23,821	
		HEAVY BREEDS. **WET MASH.**				
86	Black Orpingtons ..	C. E. Graham	1,302	117	1,419	1
97	.. ..	Marville Poultry Farm ..	1,253	105	1,358	2
89	Rhode Island Reds	E. W. Hippe	1,192	116	1,308	3
92	Black Orpingtons ..	J. Ogden	1,180	122	1,302	4
85	,, ..	H. H. Pump	1,181	110	1,291	5
81	,, ..	Mrs. T. W. Pearce ..	1,177	98	1,275	6
93	,, (5 birds)	L. W. Parker	1,131	94	1,225	7
100	,, (5 birds)	J. H. Wright	1,114	65	1,179	8
88	,, ..	J. McAllan	1,107	64	1,171	9
84	,, ..	Cowan Bros.	1,071	90	1,161	10
91	,, ..	A. Greenhalgh	1,084	61	1,145	11
87	,, ..	W. C. Spencer	1,043	109	1,152	12
98	Faverolles ..	K. Courtenay	1,024	115	1,139	13
99	Black Orpingtons ..	L. McLean	1,063	73	1,136	14
90	,, (5 birds)	Oaklands Poultry Farm ..	1,038	87	1,125	15
95	Silver Wyandottes..	W. H. Forsyth	942	104	1,046	16
94	Black Orpingtons (5 birds)	E. Fisher	926	40	966	17
83	Black Orpingtons ..	G. Mayberry	903	15	953	18
82	White Wyandottes (5 birds)	J. B. Brigden	702	54	756	19
96	White Orpingtons ..	Stranks Bros.	633	21	654	20
		Total	21,101	1,660	22,760	

MONTHLY REPORT.

Weather conditions for the month have been seasonable, and, on the whole, favorable to egg production, though the fact that the wind was from south-east on three occasions was against obtaining the best results.

Some of the birds are now moulting, but hens laying in moult are more noticeable than in previous years. Needless to say, such hens are very valuable.

The average number of eggs per hen right through the competition is 1,244 to date, which is very satisfactory. Temperatures ranged from:—lowest, 47 degrees Fahrenheit, to highest, 103 degrees Fahrenheit. Rainfall, 100 points.

Department of Agriculture, Melbourne, Victoria.

A. HART.
Chief Poultry Expert.

ORCHARD AND GARDEN NOTES.

E. E. Pescott, F.L.S., Principal, School of Horticulture, Burnley.

The Orchard.

As soon as the fruit is off the trees, the land should be well ploughed and left in a rough condition until the spring ploughing. If not already done, and the orchard conditions demand it, there is still time to put in a leguminous crop for green manuring purposes. But this should be done as early as possible, so as to give the crop a chance to make some good early growth. Soils deficient in lime or in organic matter are always benefited by a crop of green manures. Where stable manure is unprocurable, the green manure crop is the only means of adding organic matter to the soil.

Pests and Diseases.

All second-hand and old cases should be thoroughly overhauled. It is preferable to do this work now, instead of leaving it till spring, when the rush of other duties will certainly prevent it being carried out. The cases, if not bad enough to be destroyed by fire, should be dipped for some time in boiling water. And this is not only for the killing of the codlin larvæ, but also to destroy larvæ or eggs of any scale or aphis, and also any spores of fungus diseases that may have found lodgment therein.

As soon as the trees have shed their foliage they may be sprayed with red oil emulsion for woolly aphis, peach aphis, and the bryobia mite. And this should be done before pruning, so that in handling and carrying the prunings the pests will not be spread about the orchard to infect the clean portions.

Flower Garden.

The removal of permanent shrubs and palms, and the planting out of evergreen trees, shrubs, and herbaceous divisions should not be delayed any longer. The nursery section of this class should be cleared out into the garden at once. It is a mistake to wait, as many growers do, for the removal of such plants until the winter season. If planted out now while the ground is warm, the roots of the plants have a fair chance to grow, to take a considerable hold of the soil, and to establish themselves in their new location before the growth period ceases. Then, after the winter's rest, they are ready to break away into new growth, both in the roots and crown, with the advent of the first spring-weather. When planted in winter they have no chance to grow; the roots remain as when planted, and with every chance to rot in the cold, wet soil, the foliage becomes yellow and debilitated, and the plant, if it does not succumb, often takes the whole ensuing season to recover its general health. And then, of course, the season that has been lost can never be regained.

Bulbs, tubers, and corms of spring-flowering plants should now all be planted. As they appear above ground, they should be protected

from the ravages of snails and slugs, as these pests have a very great liking for these succulent growths. A good surface dressing of broken leaf or dust tobacco will effectually deal with these pests. In fact, the gardener who constantly uses tobacco, either in the leaf, stem, or dust forms, will very soon be in the happy position that slugs and snails will cause him no anxiety whatever. Besides, the tobacco has manurial properties which are also valuable.

Pansy and any other seedlings, also rooted layers and cuttings, may now be planted out into their permanent positions.

Sowings may also be made of any hardy annuals, such as antirrhinum, aquilegia, corneopsis, Canterbury bell, dianthus, everlastings, foxglove, gaillardia, hollyhock, larkspur, leptosyne, lobelia, marigold, pansy, petunia, stock, sweet peas, verbena, wallflower, &c.

Vegetable Garden.

There should now be no untidy or undug beds in the kitchen garden. The vacant beds should all be well dug over and prepared for the planting of vegetables for use in spring. In digging, a top dressing of manure should be given; this may be dug in. All weeds, too, may be forked into the trenches, and covered well with soil as each spit or length is dug. A dressing of lime is very beneficial at this time of the year three or four weeks after the manure or weed dressing.

A start should now be made at cleaning out the asparagus beds. This vegetable is most popular, and yet one rarely met with in ordinary household gardens. It is supposed to be difficult to grow, but this supposition is not borne out, as, once established, a bed of asparagus is one of the most easily managed plots in the whole garden. Depth of good soil and plenty of manure are all that this plant requires.

In establishing a new bed, it is advisable to see that there is a good depth of 2 or 3 feet of rich, well-manured soil. If this is not present, the soil should be dug out to that depth, and thoroughly mixed and enriched with well-rotted manure before being replaced. A bed deeply prepared, and supplied with ample quantities of manure, should last without replanting for very many years. The young plants or crowns should then be planted in trenches, keeping the rows 2 or 3 feet apart. An asparagus bed requires ample and direct exposure to the full rays of the sun. The asparagus should not be cut during the first season after planting; in fact, it is better to allow it to go uncut for two seasons. As little foreign weed growth as possible should be allowed in the beds, but, when they are not producing culinary asparagus, rows of lettuce, beans, radish, &c., may be grown between the crowns.

Towards the end of April the tops may be cut down, the beds cleaned, and a good top dressing of stable manure given. Chemical fertilizers, such as bonedust, sulphate of ammonia, and sulphate of potash, may be given as a substitute to organic manure. In the past it has been the custom to annually top-dress the beds with salt. It was supposed that as asparagus in its native habitat was usually found in sandy soils near the sea coast, the plant required salt or a saline soil to produce successful results. It has latterly been found that salt is not at all essential to good growth, and that the plant will readily adapt itself and grow well in soils of not at all a saline character. Where potash has taken the place of salt, quite improved results followed.

It is a good rule to observe that no ripe seeds should be allowed to fall on the beds; they should be stripped off the plants before they have a chance to drop. Seedlings will become a nuisance in the beds, and they interfere with the regularity of the rows.

A few early peas, also some broad beans, may now be sown; cabbage, cauliflower, and other seedlings should be planted out from the seed beds. All garden herbs, such as thyme, mint, horse-radish, sage, &c., as well as rhubarb, should be divided and planted out where necessary.

Onion seeds for an early crop may be planted out towards the end of the month. Brown Spanish is very hard to beat as an all-round onion, while the variety of Early Brown Spanish may be relied upon to produce an early crop.

FRANKLIN'S WORDS OF WISDOM.

Want of care does more damage than want of wisdom. For want of a nail the shoe was lost, and for want of a shoe the horse was lost.

For age and want save while you may, no morning sun lasts all the day.

Experience keeps a dear school, but fools will learn in no other.

Creditors have better memories than debtors.

Plough deep while sluggards sleep; and you will have corn to sell and to keep.

Work to-day, for you know not how much you may be hindered to-morrow.

If you have your business done, go; if not, send.

Foolish men make feasts, and wise men eat them.

He that by the plough would thrive, himself must either hold or drive.

The eye of the master will do more work than his hands.

Always taking out of the meal tub and never putting in soon comes to the bottom.

If you would know the value of money, try to borrow some.

Industry needs not wish, and he that lives upon hope will die fasting.

Buy what thou hast no need of, and ere long thou wilt sell thy necessaries.

At a great pennyworth pause awhile; many are ruined by buying bargains.

REMINDERS FOR MAY.

LIVE STOCK.

Horses.—Those stabled can be fed liberally. Those doing fast or heavy work should be clipped; if not wholly, then trace high. Those not rugged on coming into the stable at night should be wiped down and in half-an-hour's time rugged or covered with bags until the coat is dry. Old horses and weaned foals should

be given crushed oats. Grass-fed working horses should be given hay or straw, if there is no old grass, to counteract the purging effects of the young growth. Attend to teeth and feet of horses to be turned out for the winter.

CATTLE.—Cows, if not housed, should be rugged. Rugs should be removed in the daytime when the shade temperature reaches 60 degrees. Give a ration of hay or straw, whole or chaffed, to counteract the purging effects of young grass. Cows about to calve, if over fat, should be put into a paddock in which the feed is not too abundant. Calves should be kept in warm dry shed. Observe strict cleanliness in feeding to avoid losses and sickness incidental to calf-rearing.

PIGS.—As recommended in Reminders for April.

SHEEP.—Keep in-lamb ewes in strong store condition. Best results are obtained when ewes are neither very poor, nor excessively fat. Once the lambs arrive, the most liberal treatment possible is in the main the most profitable. Ill-fed ewes are bad mothers at all times—at the time, or after lambing. Select fine weather for lamb marking. Yard lambs over night. Never castrate or tail high-conditioned or very weak lambs immediately on being run in and over heated. The risk with large ram lambs will be lessened if they are allowed to stay in the yards an hour or two after castration. Draw the coagulated blood which in many cases will be found retained in the groin and purse, no matter what method of opening the purse is used. Never draw tails tight. Projecting bone delays healing, especially when cutting off with hot blades. Even with the knife leave enough loose skin to come over and check the usual strong rush of blood from lambs on well-fed mothers.

POULTRY.—Feed animal food to forward pullets, about ½ oz. daily, and equal parts heavy oats and broken maize at night. Add lucerne chaff to mash daily. See that fowl houses are free from draughts to avoid colds, also that they are free from red mites. Use Epsom salts freely to avoid Roup and Chicken Pox.

CULTIVATION.

FARM.—Dig main crop potatoes. Push on with ploughing and sowing of cereal crops, including peas and beans. Green fodder (as for April) may still be sown. Land for maize, potatoes, and other root crops should be prepared and manured. Flax may be sown. Transplant Chou Moellier and Giant Drumhead cabbage plants in rows 3 feet apart. Complete sowing permanent pastures with grasses and clovers.

ORCHARD.—Plough, manure; apply lime to orchard lands at rate or 5 or 10 cwt. per acre where soil is sour. Spray trees infested with scale insects, Woolly Aphis, and Bryobia Mite with red oil or crude petroleum. Clean all rough bark *from trees. Commence pruning early varieties at end of month.*

FLOWER GARDEN.—Digging, manuring, and pruning; trench and drain where necessary. Dress the surface with lime. Continue to sow hardy annuals. Bury all leaves, soft-wood cuttings, and weeds. Continue to plant spring blooming perennials and other plants. Plant cuttings of carnations and roses.

VEGETABLE GARDEN.—Cut down and clean out asparagus beds. Apply manure and lime dressings. Cultivate deeply. Plant out seedlings and early potatoes; sow peas, broad beans, carrots, and parsnips.

VINEYARD.—Subsoil land for new plantations if not already done. This work should be carried out as long before planting as is practicable. Vine-growers are warned against the too common practice of feeding off foliage after vintage. Any small advantage in the form of stock feed is only gained at the cost of a reduction in the following season's crop, owing to interference with accumulation of reserves, which continues so long as the leaves remain green. Sheep should not be allowed into the vineyard until all leaves have changed colour. Early and deep ploughing is strongly recommended. Manures should be applied as early as possible. Peas, &c., for green manuring, should be sown without delay, in order to take advantage of early rains. Applications for grafted resistant rootlings for 1916 must be made before end of May.

Cellars.—Rack or fill up (preferably the former) dry wines as soon as a lighted match, introduced at bung hole, is no longer extinguished. Sweet wines should also be racked and fortified to full strength.